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AGRICULTURAL CHEMISTRY—AGROTECHNY.

Handbook of biochemistry of man and animal, edited by C. OPPENHEIMER (*Handbuch der Biochemie des Menschen und der Tiere*, Jena, 1918, sup. vol., pp. 311+746, figs. 53).—This is a supplementary volume to those already noted (E. S. R., 26, p. 306), and includes the following chapters: The General Significance of the Hydrogen Ion Concentration in Biology (causes in biological problems, the hydrogen ion concentration of the body fluids, etc.), by L. Michaelis; Progress Made in the Field of Protein Chemistry, by P. Rona; Nucleic Acids and their Cleavage Products, by C. Brahm; Morphological Constituents of the Blood and Spermatozoa, by A. Kanitz; The Properties of Hemoglobin, by E. Müller; Oxidation Processes in the Living Tissues (processes in slow combustion, including catalytic phenomena, enzymes of respiration, and the physiological significance of respiratory enzymes), by A. Bach; Gaseous Exchange in Organs, Tissues, and Isolated Cells, by A. Loewy; Anaphylaxis, by E. Seligmann; Biochemistry of the Skin, by P. G. Unna and L. Golodetz; Mechanics of Gastric Secretion, by A. Bickel; Internal Secretions of the Pancreas, by S. Rosenberg; New Investigations in regard to Digestion and Resorption of Foodstuffs, by E. S. London; Fetal Hormones, by B. Wolff; The Nervous System and Internal Secretions, by G. Peritz; Biochemistry and Radio-active Substances, by J. Plesch; The Decomposition of Sugar by the Cell, by C. Neuberg; Biochemistry of Growth of Man and other Higher Animals, by H. Aron; Metabolism and Sexuality of the Female, by L. Zuntz; and Parenteral Protein Metabolism, by W. Caspari.

Handbook of biochemical methods, edited by E. ABDELHALDEN (*Handbuch der Biochemischen Arbeitsmethoden*, Berlin and Vienna, 1918, vol. 7, pp. XXVIII+912, figs. 198).—This is the seventh volume of this work (E. S. R., 29, p. 408), and contains the following chapters: The living animal material for biochemical investigations (selecting, obtaining, and keeping under various conditions); the use of secretin for obtaining pancreatic juice; the detection and preparation of methylated amino acids (betains) in animal and vegetable tissues; preparation of some substances of biochemical importance from molasses and molasses slops; the most important methods for examining foods and condiments (a very extensive chapter); the technique of investigating the respiratory gaseous exchange in healthy and diseased subjects; the precipitins and methods of precipitation; the methods of investigating the biochemically important actions of light; microscopic technique; some rapid methods for the examination of blood in urine; the quantitative determination of chlorine ions in blood; the

preparation and detection of glucosids; researches with radio-active rays; and movement of gas and water in the plant (transpiration, root pressure, etc.).

Discussions of the Eighth International Congress of Applied Chemistry (*Orig. Commun. 8. Internat. Cong. Appl. Chem. [Washington and New York], 27 (1912), pp. XIII+190*).—This includes the discussions of the various sections among them analytical, inorganic, agricultural, and organic chemistry; industry and chemistry of sugar; India rubber and plastics; fermentation; fats, fatty oils, and soaps; paints, drying oils, and varnishes; starch, cellulose, and paper; hygiene; pharmaceutical chemistry; bromatology; biochemistry, including pharmacology; electrochemistry; and law and legislation affecting chemical industry.

Researches on cellulose, C. F. CROSS and E. J. BEVAN (*New York, London, and Bombay, vols. 2, 1906, pp. XI+184; 3, 1912, pp. X+173*).—These are the second and third reports on this topic (E. S. R., 13, p. 916). Volume 2 deals with cellulose as a typical colloid; cellulose as a chemical individual; cellulose and structural forms—dimensions; nitric esters; aceto-sulphates; cellulose-xanthogenic acid; cellulose and alkaline hydrates; theory of dyeing; electrolytic phenomena; constitution of cellulose; hydrocellulose; mixed esters—chloracetyl derivatives of hydrocelluloses, etc.; animal digestion and assimilation of cellulose; destructive fermentations; and technical progress in cellulose industries, and a general forecast of technological developments.

Volume 3 deals with cellulose in relation to biological science; its constitution; cellulose esters, acetate, and comparative studies of acetylation, furanyl derivatives, and xanthogenic esters; lignocelluloses, reactions with halogens, constitution, and study of autoxidation; technical developments, textile industries (bleaching, paper making, and commercial jute and "heart-damage"); special industries; artificial fibers, film products, and applications of cellulose acetates. The use of bastol, a product made by treating sawdust with aqueous sulphurous acid, and which is used as a constituent of some cattle feeds in England is also discussed.

Relation of the reducing power to the fermentative capacity of various carbohydrates, E. SCHLICHTING (*Abs. in Orig. Commun. 8. Internat. Cong. Appl. Chem. [Washington and New York], 26 (1912), Sects. VIa-XIb, p. 83*).—The paper gives the results of a large number of experiments from which the author has drawn the following conclusions:

"(1) All results found for the amount of actual fermentable sugars by the fermentation method are generally too low, and form about 1 to 6 per cent less than the real amount of sugars present, excepting in mixtures of equal parts of saccharose and dextrose. (2) Fermentation methods of sugar determination should be invariably carried out with pure cultures of yeasts, under uniform conditions of time, temperature, nature, and quantity of yeast nutrients. (3) Certain real relations undoubtedly exist between the reducing power and the fermentability of sugars which enable the analyst to find the correct amount of fermentable sugars, especially when only 2 carbohydrates (of those mentioned) are present. (4) When more than 2 sugars are present in the solution, the results found for fermentable sugars by their reducing power are from 3 to 6 per cent in excess of the truth."

On koji acid, a new organic acid formed by *Aspergillus oryzae*, T. YABUTA (*Orig. Commun. 8. Internat. Cong. Appl. Chem. [Washington and New York], 25 (1912), Sects. I-Ve, pp. 455-462*).—Large quantities of an acid obtained from *A. oryzae* grown on steamed rice were prepared. Saito has previously described this acid as β -resorcylic-carbolic acid. The empirical formula for the recrystallized product was found by this investigator to be $C_{10}H_8O_6$. "From the copper salt, as well as from the acetyl and benzoyl derivatives, the presence of 2 carboxyl and 4 hydroxyl groups in the molecule has also been ascertained, so that

the formula may be written as $C_{10}H_7(OH_4)(COOH)_2$. It is therefore quite different from β -resorcylic-carbonic acid, and so far as the author knows, the occurrence of such an acid in fungi has never been mentioned before." The name koji acid has since been given to the substance.

In regard to the proteolytic activity of taka-diaxase, OLGA SZÁNTÓ (*Biochem. Ztschr.*, 43 (1912), No. 1-2, pp. 31-33).—The results show that acids in small concentrations affect the action of taka-diaxase, mineral acids having the least effect. Compared with trypsin, it is more susceptible to organic acids, and hydrochloric acid destroys it more quickly.

Inhibition is less by alkalis than by acids, and alkalis do not destroy it. Salts do not, or only slightly, inhibit its action. Neutral salts, such as sodium chloride, sodium sulphate, and sodium nitrate, do not affect it, but inhibit the activity of trypsin. The same effect was noted with most organic salts, but not with sodium lactate. Dextrose, lactose, and starch do not affect it, while levulose shows a slight inhibition of its activity.

The nature and function of the plant oxidases, E. D. CLARK (*Turkey*, 11 (1911), Nos. 2, pp. 23-31; 3, pp. 55-61; 4, pp. 84-92; 5, pp. 101-110).—"The oxidases are of very wide distribution among the flowering plants, peroxidases, especially, being present in about 75 per cent of all the specimens examined, while oxygenases (direct oxidases) are less widely distributed, being found in one-half of the plants used. Catalase may be said to be universally distributed, since there were only a few cases in which it was not found. The leaves, stems, roots, and food-storage organs of the plants seemed to contain the greatest amounts of the oxidases. The flowers and fruit were in many cases comparatively poor in oxidases. In regard to the fruits this statement must be qualified, because dry seeds of somewhat uncertain age were the only available material of certain species.

"Our experience with a great many parallel tests, using the different oxidase reagents upon a great variety of vegetable tissues, show that all of the reagents seem to detect the same substance or substances, for if one reagent gave a positive test, the others generally acted in like manner. The phenolphthalein and indophenol reagents gave positive results in more cases than the others. This is undoubtedly due to their greater ease of oxidation, for they are spontaneously oxidized by the air. It is probable that in the presence of acid juices in the plant the latter does not form oxidases or else that they are immediately destroyed by the acid. It was shown that the inhibiting effect of acids upon the action of oxidases seemed to be a function of the concentration of the hydrogen ions.

"Among plants the chromogens are found to the greatest extent in certain orders, such as the Lilliales, Orchidales, Ranales, and most frequently of all in the latex plants of the Convolvulaceae, Boraginaceae, Labiatae, Solanaceae, Rubiaceae, Compositae, etc. Active oxidases are also likely to be associated with chromogens in the latex plants. These conclusions are interesting because of the bearing they have upon Palladin's theory that these chromogens play an important part in the respiration and the metabolism of plants."

A comprehensive review of the literature of the oxidases is included.

Investigations in regard to phosphatase, H. von EULER (*Abh. in Chem. Ztg.*, 36 (1912), No. 138, p. 1353).—This enzyme has the property of combining inorganic phosphoric acid with carbohydrates, forming an organic phosphoric acid ester, glucophose. Glucophose was cleaved both in the intestine and kidney, and was synthesized with extracts of these organs.

Glucophose is considered a catalyzer for sugar cleavage by living yeast and also an intermediary product of this reaction. Judging from this phenomenon it seems reasonable to assume that the cleavage of sugar in the animal organ-

ism occurs in the same way. The reason that we have not been able to determine the specific enzyme bringing about the cleavage of sugar is probably because a number of enzymes are concerned in the process; furthermore, the enzymes are localized in various organs, consequently the cleavage of sugar in the body occurs in various phases. When the equilibrium of one of these phases is destroyed, a sort of diabetes occurs.

Glucophose gives us a means for determining in what part of the cycle sugar combustion is abnormal. With it the weakest phase of the process may possibly be enhanced. Living yeast is incapable of producing glucophose but when phosphatase is liberated from the cell it synthesizes this compound.

The problem of enzyme synthesis.—I, Lipase and fat of animal tissues. H. C. BRADLEY (*Jour. Biol. Chem.*, 13 (1913), No. 4, pp. 407-418, figs. 2).—These tests, which were made with the tissues and fluids of the fish, cat, dog, calf, goat, and adult bovine, indicate that "no broad correlation exists between the fat and lipase content of tissues. Homologous organs in allied species, such as teleost livers, fish muscles, etc., show no parallelism between fat and enzyme. Some of the most active fat-producing tissues are relatively poorer in lipase than many other tissues which never normally contain or produce more than a small percentage of fat. Active mammary tissue affords the most striking example of this when compared with lung, kidney, and muscle tissues." "Instead of being unusually rich in lipase on account of its active secretion of fat, it is found to be about on a par with such other tissues as fish ovaries and testes, spleen, brain, and other gland structures of mammals and invertebrates. Compared with a large number of tissues, active mammary gland is not a tissue rich in lipase; it is only twice as active as blood itself. The fact that active mammary tissue is richer in lipase than inactive, as was pointed out by Loevenhart, is probably due in large measure to its hyperplastic condition during lactation."

"Quantitative comparison of fat and lipase in animal tissues gives no positive evidence in support of the theory of enzyme synthesis."

The problem of enzyme synthesis.—II, Diastase and glycogen of animal tissues. H. C. BRADLEY and E. KELLERSBERGER (*Jour. Biol. Chem.*, 13 (1913), No. 4, pp. 419-423).—The results confirm the findings of H. MacLeun,² who showed that kidney and lungs usually low in glycogen had a high diastatic power. The work was done with the lower form of animals, fish, crustaceans, etc., which are known to be rich in glycogen.

The problem of enzyme synthesis.—IV, Lactase of the mammary gland. H. C. BRADLEY (*Jour. Biol. Chem.*, 13 (1913), No. 4, pp. 431-439).—The results show that the active mammary gland of cats, goats, and rabbits contains no lactose-destroying enzyme. In two cases (goat and cow) there seemed to be a progressive increase of sugar, especially when blood was added to the mixture. This may be due to the presence of a mother (pro) substance as indicated by Porcher (*E. S. R.*, 17, p. 287). Lactase, according to this, does not seem to be responsible for the lactose present in milk.

Contributions to our knowledge of the vegetable hemagglutinins. R. KOBERT (*Landw. Vers. Stat.*, 79-80 (1913), pp. 97-265).—This discusses the chemical nature of ricin and its preparation; the agglutination reaction and its use for detecting castor-bean meal in feed cakes; the chemical nature of antiricin; castor-bean lipase and its action; the action of ricin upon animals; the detection of ricin in feeds which contain other agglutinins and in those stuffs which contain no other agglutinins; crotin, abrin, and robin from common locust seed. (*Robinia pseudacacia*), and phasin from other sources; papilionaceous

² *Bio-chem. Jour.*, 4 (1909), No. 10, pp. 467-479.

plants in which hemolysins instead of phasins are present; and pseudoagglutination.

The analysis of rare earths and earth acids, R. J. MEYER and O. HAUSER (*Die Analyse der seltenen Erden und der Erdsäuren*, Stuttgart, 1912, pp. 529, fig. 14).—This book is divided into a qualitative and a quantitative section, and is devoted to the analysis of rare earths and their acids. It constitutes the fourteenth and fifteenth volumes of R. M. Margosches' series of books on analytical chemistry.

Application of the ammonium carbonate method for the determination of humus to Hawaiian soils, J. B. RATHER (*Jour. Indus. and Engin. Chem.*, 5 (1913), No. 3, pp. 222, 223).—After commenting upon what has been reported by Kelley and McGeorge (E. S. R., 27, p. 7), it is stated that "the ammonium carbonate method for the removal of clay from humus solutions has given uniformly good results on a number of the soil types of the United States, but on exceptional soils, like some of those of Hawaii, a slight modification of the method is necessary to remove the clay. The modification consists essentially in increasing the amount of ammonium carbonate to 2 gm. per hundred cubic centimeters, and heating for 1 hour."

The determination of colloids in cultivated soils, C. HASSLER (*Sitzber. Naturhist. Ver. Preuss. Rheinlande u. Westfalens*, 1911, Nos. 1, Sect. C, pp. 13, 14; 2, Sect. C, pp. 15-24, fig. 1).—Previously noted from another source (E. S. R., 26, p. 519).

Loss of fat as a result of drying meat, M. TAMURA (*Biochem. Ztschr.*, 41 (1912), No. 1-2, pp. 78-101; *abs. in Zentrbl. Biochem. u. Biophys.*, 13 (1912), No. 14-15, p. 567).—As a result of drying and powdering meat, a loss of fat takes place. The larger the amount of meat, the greater the loss. If alcohol is added during the drying, the loss of fat is considerably reduced.

It is deemed advisable, when working according to Shimidzu's paste method or the powder method, to use no more than 300 gm. of material at one time.

Determination of fat in bread, G. GATJIC (*Orig. Commun. 8. Internat. Cong. Appl. Chem. [Washington and New York]*, 26 (1912), Sects. VIa-XIb, pp. 1-3).—The usual methods proposed for extracting the fat in foods can not be applied to the estimation of fat in bread. Previous drying or finely grinding the sample does not increase the yield of fat, but by extracting the crumbs of entirely fresh bread, other than rye bread, almost all of the fat present is extracted. The procedure recommended for all kinds of bread, including old bread, is the following, which is based on Volenske's method:

Five gm. of bread crumbs, moist or previously ground dry, is placed in a 250 cc. flask supplied with a condensing tube, mixed with 50 cc. of water and 2 cc. of a 25 per cent solution of hydrochloric acid (specific gravity 1.125), and heated for 14 hours in a boiling water bath. After cooling, 1 cc. of a 0.04 per cent solution of methyl orange is added, neutralized with concentrated alkali, acidified with 1 drop of dilute hydrochloric acid, filtered through a small folded filter, and the residue washed with hot water. The filter with its contents is then spread on a watch glass, dried for 2 hours at 105° C., and extracted in a Soxhlet apparatus for 6 hours with ether.

The results obtained with rye bread, white bread, and baked goods prepared with skim and whole milk compare very well with the fat present in the flour from which the products were made.

The polarimetric determination of starch in potatoes, F. HERLEN (*Orig. Commun. 8. Internat. Cong. Appl. Chem. [Washington and New York]*, 26 (1912), Sects. VIa-XIb, pp. 5-10).—Estimating the amount of starch present in potatoes by the specific gravity method leaves much to be desired, while the methods

depending upon the conversion of the starch into sugar are cumbersome. The polarimetric methods seem to be the most appropriate for this purpose.

For the solution of the starch, the author utilizes hydrochloric acid, which was first pointed out by Effront. A fine paste is prepared of the potatoes with a beet press or chopping machine, and 8.82 gm. (for Mohr's cubic centimeters) or 8.8 gm. (for metric cubic centimeters) of the paste is brought into a 100 cc. flask with the aid of 25 cc. of water, and amid stirring 25 cc. of fuming hydrochloric acid (specific gravity 1.188) is added. The mixture is allowed to stand for about 1 hour, stirring frequently during the interval, and then water is added to make 100.35 cc. This is shaken, filtered, and polarized at 20° C. with a Venzke-Soleil polariscope. The reading obtained gives the percentage of starch present.

A more rapid method consists of weighing out 9.55 gm. (Mohr's cubic centimeters) or 9.53 gm. (metric cubic centimeters) of the potato paste into a beaker glass. The weighing glass is washed off with 25 cc. of water, dried with a piece of filter paper, and the paper thrown into the beaker; 25 cc. of fuming hydrochloric acid is then added, stirring constantly during the process. This is allowed to stand for 1 hour, stirring the mass during this period, when 50 cc. of water is added, shaken, filtered, and polarized as before.

The specific gravity of citrus fruit as a factor in the separation of frozen fruit, R. A. GORDON (*Abs. in Orig. Commun. 8. Internat. Cong. Appl. Chem. [Washington and New York], 26 (1912), Sects. VIa-XIb, p. 387*).—This reports briefly the results of determining the floaters among 5 varieties of sound oranges and 2 varieties of sound cured lemons. The fruit was floated on alcoholic solutions of various strengths and specific gravities.

"The specific gravity varies with the growing district, the variety, the size, and the time of picking. The limits of variation are too great to allow of the use of any method, dependent upon the specific gravity of the fruit, for the accurate commercial separation of frozen from sound fruit, although any lot of partly frozen fruit can be bettered by proper treatment in alcoholic solutions of the proper gravity."

Tables showing results of attempted separation by floating fruit in 160 proof alcohol and subsequently putting that fruit which floats under diminished pressure and refloating in the same solution are given, also tables showing proximate analyses of sound and frozen oranges of various specific gravities to show additional factors which influence the specific gravity of the fruit.

Honey examination, H. WITTE (*Ztschr. Öffentl. Chem., 18 (1912), Nos. 19, pp. 362-373; 20, pp. 390-397*).—A discussion as to the value of determining the nonsaccharin substances, ash, acidity, saccharose, the presence of Ley's reaction, albuminate, the precipitation according to Lund, the presence of starch slurr, Flebe's test, Auzinger's reaction, and Thöni's precipitation reaction for judging honey. The complete protocol resulting from the analyses of 53 various kinds of honey is given.

Determination of sucrose in confectionery containing cooked starch and in marshmallows, C. C. ROBERTS (*Abs. in Orig. Commun. 8. Internat. Cong. Appl. Chem. [Washington and New York], 25 (1912), Sects. I-Ve, p. 539*).—After pointing out the difficulties encountered in clarifying solutions of starch paste confectionery and marshmallows, a method is recommended in which dilute alcohol (made by diluting 400 cc. of commercial alcohol to 1,000 cc. with water) is used as a solvent for the sucrose. The normal weight, 26.048 gm. of an average sample of the confectionery, is treated with some of the dilute alcohol until solution has taken place, transferred to a 200 cc. flask, clarified with a solution of subacetate of lead (specific gravity 1.25) or alumina cream, or both.

made up to volume with dilute alcohol, and filtered. The filtrate is then polarized as usual.

For inversion 50 cc. of the filtrate is evaporated to remove the alcohol and then inverted in the usual manner. The sucrose is calculated by Clerget's formula.

A method for the detection of color in tea, E. ALBERTA READ (*Orig. Commun. 8. Internat. Cong. Appl. Chem. [Washington and New York], 18 (1912), Sect. VIII, pp. 301-303*).—The method described below was devised for the purpose of detecting color in tea, inasmuch as the chemical methods suggested by Allen, Leach, Villiers, and Collin, and the International Committee for the Unification of Analytical Methods for Food-products can not be used without difficulty where small quantities of color are present, largely because of the masking effect produced by the natural color of the tea. The proposed method has the advantage that it will detect much smaller amounts than are found by the chemical method, although it overlooks traces of color which would be found with a compound microscope. It can be used by persons unskilled in scientific methods, and has the additional advantage of being rapid.

The articles needed for testing the tea are sieves, 16 to 24 meshes to the centimeter, a spatula or case knife, and a piece of unglazed white paper. A small amount of tea, about 25 to 50 gm., is placed in a sieve and shaken over a piece of white paper. If the tea is tightly rolled, it should be slightly crushed either before putting into the sieve or by rubbing it against the sieve. The dust on the paper is then crushed by dragging over it a spatula or case knife, pressure being applied by the finger to the end of the spatula. This crushes not only the tea dust, but any particles of color which are present. The process of dragging the knife across the paper streaks the color, making it more easily seen. A lens with a magnification of 8 to 12 diameters is useful in detecting the smaller streaks. Sunlight is desirable; bright light is essential for this work. This method will detect any coloring as blue, tumeric or carbon. It can also be employed for determining whether tea has been faced, but instead of the white paper, black, unglazed paper is used, on which the facing leaves a white streak.

The chloral hydrate test for charlock, A. L. WINTON (*Orig. Commun. 8. Internat. Cong. Appl. Chem. [Washington and New York], 26 (1912), Sects. VIIa-XIb, pp. 409-411*).—For general use the following reagent and procedure is proposed:

"Dissolve 16 gm. of crystallized chloral hydrate in 10 cc. of water. To the solution add 1 cc. of concentrated hydrochloric acid. In making the test, mount about 10 mg. of the mustard flour (or an equivalent amount of prepared mustard) on a slide in the reagent, heat cautiously (never to boiling) for a moment, and examine under a lens. Note the proportion of fragments of hulls that acquire a carmin red color (charlock) to those not changed in color."

Progress made in the chemistry of milk and dairy products during the year 1911, M. SIEGFELD (*Chem. Ztg., 36 (1912), Nos. 149, pp. 1369, 1370; 141, pp. 1378, 1379; 143, pp. 1394, 1395*).—This deals with the advances made in regard to the chemistry, physiology, and technology of milk and other dairy products. The topics are dealt with under the headings of physiology, general chemistry of milk proteins, fats, sugar, ash, enzymes, tests for detecting heated milk, and cream, butter, and milk preparations.

New method for determining fat in cheese by the acid method without the use of amyl alcohol, W. D. KOOPER (*Milchw. Zentbl., 41 (1912), No. 24, pp. 753-757*).—It is a well-known fact that the use of amyl alcohol is undesirable, particularly because it forms compounds with some of the cheese particles

which go over into the fat in varying amounts. Accordingly, a method is proposed which does away with the use of amyl alcohol and at the same time is easy to operate, is exact, uses a low concentration of sulphuric acid, and is not influenced by high temperatures.

In the method 6.5 cc. each of sulphuric acid of specific gravities 1.54 and 1.52 are used. After adding the weaker acid, the butyrometer is heated in a water bath at the temperature of boiling water until the cheese has been dissolved; then the stronger acid is added. After the solution shows a light brown to violet coloration, it is centrifuged at 1,000 revolutions per minute for 5 minutes, placed in the water bath at 70° C. for a short time, and the fat column read off. It is necessary that the fat be clear, that no plug formation has taken place, and that the color of the fat is a faint pink to a very light brown.

The results of examining 20 different kinds of cheese in various stages of ripeness are given, and compared with the results obtained by the gravimetric method.

New acid-butyrometric method for determining fat in cheese and dairy products. HAMMERSCHMIDT (*Milchz. Zentbl.*, 41 (1912), No. 24, pp. 757-763, fig. 1).—The author noted that when sulphuric acid was allowed to act upon amyl alcohol a compound was formed which was finally calculated as fat in the acid-butyrometric method. Amyl alcohol can also go over into the fat as such and cause certain errors in the final calculation.

In order to eliminate the use of amyl alcohol or acetic acid, which is employed in some methods, the author has previously reported on a modification of the Burstert (E. S. R., 21, p. 523) method. Not finding this method suitable on account of the cumbersome apparatus which it employs, he has now devised a new method which can be used with an apparatus similar to the butyrometer. He found that when certain criteria are adhered to in regard to decomposing casein, the casein may be dissolved in a special solution of borax (strength not given). If sulphuric acid and amyl alcohol are then carefully added, satisfactory results are obtained.

A number of analyses were made of cheese, the results of which are reported. Estimation of fat in cheese by the "neu-sal" method, O. WENDLER (*Milchz. Zentbl.*, 41 (1912), No. 24, pp. 763-765).—A description of a new butyrometer for estimating fat in cheese. The solvent used is composed of a salicylate and hyposulphite. For clarifying the fat butyl alcohol is employed.

On the relationship between the weight of the sugar beet and the composition of its juice, J. A. HARRIS and R. A. GORTNER (*Jour. Indus. and Engin. Chem.*, 5 (1913), No. 3, pp. 192-195, figs. 3).—It is believed that the relation of the size of beet to sugar yield has been too little studied. The studies have been conducted, the authors believe, by inadequate methods, and consequently it seemed of importance to measure the intensity of this relationship on the -1 to +1 scale of the coefficient of correlation; also to write the regression equations showing the absolute change in solids, sugar, or purity, associated with a unit change in weight of the beet.

"Suitable published data seem all but wanting. In many series the weights given are averages, without specification as to the number of beets included. Analyses have been made by the thousands, and in some cases upon uniform material drawn from the same cultural conditions, but [the authors] have not been able to obtain such records, either published or in manuscript."

The data analyzed by statistical methods were obtained from Bulletin 39 of the Division of Chemistry of this Department (E. S. R., 5, p. 1004), and Bulletin 32 of the Nevada Experiment Station (E. S. R., 9, p. 349). The beets considered were Klein Wanzlebener, Improved Klein Wanzlebener, Veshesserten Klein Wanzlebener, Vilmorin Améliorée, and Desparez.

"Considering the shortness of the materials upon which they are based, these results are surprisingly consistent throughout. They show that composition and purity are very closely correlated with weight, and in such a way that as weight increases, total solids, sucrose, and percentage purity fall rapidly. The rate of fall on the relative scale of -1 to $+1$ is shown by the coefficient of correlation r , the rate in an absolute scale by the second term of the regression equation."

Graphs of most of the equations were prepared, and while the empirical means are very irregular, there is no evidence to show that the regression is other than linear.

The amount of nitrogen in beets and molasses during the years 1907-1911. SAILLARD (*Bul. Soc. Nat. Agr. France*, 72 (1912), No. 6, pp. 345-350).—The methods of sampling and analyzing beets are described. The beets harvested in 1911 were found to contain much more total albuminoid, ammoniacal, amido, and injurious nitrogen than has been observed in previous years. This is supposed to be due to the dry season. A large amount of nitrogen in beets has a tendency to reduce the sugar yield and to increase the yield of molasses. Certain technical difficulties are also encountered in the use of beets high in nitrogenous substances.

Quantitative determination of the bitter substances of hops, I. AMER (*Ztschr. Gesam. Brauw.*, 35 (1912), No. 35, pp. 406-410; *abs. in Jour. Soc. Chem. Indus.*, 31 (1912), No. 20, p. 1003).—This is a modification of Lintner's method (*E. S. R.*, 11, p. 22), and consists of boiling 10 gm. of hops, previously disintegrated in a chopping machine, for 7 hours with 200 cc. of petroleum ether (boiling point 48° C.). After cooling, the extract is made up to 255 cc., and 50 cc. of the filtered liquid is titrated with tenth-normal potassium hydroxide solution, using 10 drops of a 1 per cent solution of phenolphthalein as the indicator. The titration is finished when the yellowish brown layer, after thoroughly shaking, has a carmin red tint. The volume of tenth-normal alkali solution used, multiplied by 2, gives the percentage of bitter substances present in the hops. If necessary, the boiling point of petroleum ether can be adjusted to 48° by adding benzine, etc. A variation of 10° in the boiling point, however, was found to make a difference of only 0.5 per cent in the bitter substances.

The detection and estimation of arachis oil, N. EVANS (*Analyst*, 37 (1912), No. 449, pp. 487-492).—The method recommended for the estimation of arachis (peanut) oil is as follows:

"Weigh out 5 gm. of the oil into a saponification flask, and 25 cc. of alcoholic potash (80 gm. potash dissolved in 80 cc. water and diluted to a liter with 90 per cent alcohol), and saponify for about 5 minutes under a reflux condenser. To the hot soap solution add 7.5 cc. of acetic acid (1 volume of glacial acetic acid to 2 volumes of water) and 100 cc. of 70 per cent alcohol containing 1 per cent (by volume) of hydrochloric acid, and cool to 12 to 14° C. for an hour. Filter and wash with 70 per cent alcohol containing 1 per cent hydrochloric acid at 17 to 18° , the precipitate being broken up occasionally by means of a platinum wire bent into a loop. The washing is continued until the filtrate gives no turbidity with water, the washings being measured. Dissolve the precipitate, according to its bulk in 25 to 70 cc. of hot 90 per cent alcohol, and cool to a fixed temperature between 15 and 20° . If crystals appear in any quantity, allow to stand at this temperature for 1 to 3 hours, filter, wash with a measured volume of 90 per cent alcohol (about half the volume used for crystallization), and finally with 50 cc. of 70 per cent alcohol. Wash the crystals with warm ether into a weighed flask, distill off the ether, dry at 100° , and weigh. If the melting point is lower than 71° , recrystallize from 90 per cent alcohol. Add the correction for the solubility in 90 per cent alcohol as in Renard's

process from the table given by Archbutt (Allen's Commercial Organic Analysis, 4. ed., vol. 2, p. 94), and also for the total volume of 70 per cent alcohol used in precipitating and washing (including the 100 cc. added in the first instance).

"If there are no crystals from 90 per cent alcohol, or if they are only in very small amount, add a sufficient quantity of water to reduce the strength of the alcohol to 70 per cent (31 cc. water to 100 cc. 90 per cent alcohol). Crystallize at 17 to 19° for an hour, filter, wash with 70 per cent alcohol, and weigh as before, adding the correction for 70 per cent alcohol. If the melting point is below 71°, recrystallize from a small quantity of 90 per cent alcohol, or again from 70 per cent alcohol.

"The following oils gave no crystals: Olive oils, including 'nice superdne,' 'nice seconds,' 'Malaga,' and S. of unknown origin, almond, poppy, and rapeseed oils."

A clinical method of estimating the amount of calcium in the urine and other physiological fluids, W. B. BELL (*Bio-chem. Jour.*, 6 (1912), No. 3, pp. 205-209, figs. 2).—Finding that the precipitates obtained with oxalic and acetic acids for many specimens of urine were pure calcium oxalate, providing the proper precautions as regards phosphates were observed, a method was devised for determining the calcium in urine and similar fluids.

"A sample from a 24 hours' specimen of urine is made faintly acid with hydrochloric acid to dissolve any insoluble phosphate present. It is then made faintly alkaline with ammonia, and filtered. Next 5 cc. of the filtrate is placed with a pipette in the special centrifuge tube, which is of the usual size and shape in the upper portion, but tapers at the lower end into a cylindrical extremity of even bore (1.25 mm.) and calibrated into 1 mm. divisions. A line, with 'urine' marked below it, encircles the upper part of the tube at the 5 cc. level. Any air bubbles which may collect in the calibrated portion are got rid of with a fine wire or strand of silkworm gut. Then 1 cc. of the reagent, consisting of a saturated solution of oxalic acid in a 5 per cent solution of acetic acid, is added. The correct quantity of reagent (1 cc.) is also indicated by a line round the tube, which is marked 'reagent.' Finally 2 cc. of alcohol or methylated spirit, as indicated by the line marked 'alcohol,' is added, and the contents of the tube are thoroughly mixed by shaking.

"The second tube is then taken, and 5 cc. of the standard solution (0.05 gm. of calcium phosphate, $\text{Ca}_3(\text{PO}_4)_2$, is dissolved in a little hydrochloric acid. Make alkaline with ammonia and acid with acetic acid. Add 2 gm. of urea to the solution, and dilute the whole up to 100 cc. with distilled water; specific gravity, 1.015) is run into it with a pipette that is up to the line marked 'solution,' and any air bubbles removed as before. Next the reagent and alcohol are added, as in the case of the first tube, and the whole is thoroughly shaken. Both tubes, with their calibrated end packed in wool, are then carefully placed in the opposite buckets of a centrifuge, and are centrifuged for about a quarter of an hour. On removing the tubes the precipitate will be found to stand at a certain height, say 10 mm. in the 'standard-solution' tube, while it may stand at 7 mm. in the other, which contains the urine to be examined. As a rule, there is a slight slant on the surface of the deposit. This can be obviated by stopping the machine at the end of 1 or 2 minutes and turning the tubes through half a circle."

When the method was compared with the usual chemical method for determining calcium it was found that the greatest difference never amounted to more than 1 per cent of the quantity present in the sample.

A new method for detecting methyl alcohol, P. N. RAIKAW (*Orig. Commun. 8. Internat. Cong. Appl. Chem. [Washington and New York], 25 (1912), Sect. I-Ve, pp. 417-419*).—The method is based on the behavior of nitromethane and

its immediate homologues toward sodium nitroprussid in an alkaline (ammoniacal) solution. If a few drops of sodium nitroprussid are added to a solution containing nitromethan an indigo blue coloration is produced.

A procedure for applying this test for the detection of denatured alcohol is also described.

METEOROLOGY—WATER.

On some meteorological conditions controlling nocturnal radiation, J. R. SUTTON (*Trans. Roy. Soc. So. Africa*, 2 (1912), pt. 5, pp. 381-393).—This paper is based upon observations at Kimberley during a period of 8 years with 2 radiation (spirit) thermometers, one placed upon the grass and the other mounted on a light brass stand 5 in. above the grass.

The general conclusion reached is "that after allowance has been made for the state of the sky and the movement of the air, the only factor of real importance determining the magnitude of the radiation-temperature gradient is the relative humidity. The absolute humidity, as such, is unimportant."

Some causes and effects of variation in the range of temperature, J. R. and ELIZABETH M. SUTTON (*Trans. Roy. Soc. So. Africa*, 2 (1912), pt. 4, pp. 341-356).—This paper presents the results of a study of what variation if any of the diurnal curve of barometric pressure accompanies a greater or less range of temperature as night follows day.

Nitrogen in rain and snow, N. KNIGHT (*Proc. Iowa Acad. Sci.*, 18 (1911), pp. 75-77).—The results of analyses with reference to the nitrogen content of 9 samples of snow and 8 samples of rain collected at Mount Vernon, Iowa, during 3 months, excluding May, June, July, and August, of 1910 are given. The total amount of nitrogen brought down to the soil by precipitation during this period was 13.71 lbs. per acre.

Dry season and droughts in Rhodesia, E. GOULD (*Rhodesia Agr. Jour.*, 10 (1913), Nos. 4, pp. 538-544; 5, pp. 691-698; 6, pp. 828-842).—The rainfall throughout Rhodesia during the dry season for a number of years is summarized and the conclusion is reached that there is no useful rainfall from April to October, inclusive. Droughts of more or less severity also occur during the so-called rainy season, a fortnight or more without rain or 20 to 25 days with not more than $\frac{1}{2}$ in. of rain being considered a drought. The distribution of droughts throughout the year for a series of years is shown. Changes in farm practice better to adapt them to weather conditions are discussed.

The regime of underground waters in the neighborhood of Polesia, E. V. OROKOV (*Pochvovedenie (Pédologie)*, 15 (1913), No. 2-3, pp. 29-57, pt. 1).—Nine years' observations are reported on ground water level and the factors affecting it made on three wells in the immediate neighborhood of Polesia in the Province of Minsk. The variations in ground water level and the effects of atmospheric precipitation, evaporation, and temperature on its position are graphically represented.

From his observations the author concludes that the atmospheric precipitations have a marked influence on the height of ground water level, which is manifested within a short time, generally not more than a month after precipitation during the warm months. He further concludes that the sinking of the ground water level during the dry years was due entirely to loss by evaporation, etc., that the rise of water level during the wet years was due to the recuperation of the average quantity of soil moisture during the rainy periods following the dry periods, and also that the excess water of a rainy year is held in reserve for the dry year or years following.

Water supplies, with special reference to underground water, L. K. WARD (*Jour. Dept. Agr. So. Aust.*, 17 (1913), No. 4, pp. 494-504).—Referring especially

to South Australian conditions the author briefly discusses rainfall, its use and loss, artesian water, artesian basins, the salt content of rain, ground water, well types, factors determining quantity and quality of water, well location and protection, tanks, and the use of the divining rod. Observations made in New Zealand are said to prove that every inch of rain falling over an acre of ground deposited $4\frac{1}{2}$ lbs. of salt.

The advice of a geologist is considered preferable to that of a diviner in locating underground water supplies.

SOILS—FERTILIZERS.

The geology of soils and substrata with special reference to agriculture, estates, and sanitation, H. B. Woodward (*London and New York, 1912, pp. XVI+366, pls. 4, figs. 44; rev. in Science, n. ser., 38 (1913), No. 983, pp. 626, 627*).—This book gives an outline of geology in its broader relations with agriculture and sanitation, and discusses the preparation of geological maps and soil surveys; soils, subsoils, and substrata; weathering of rocks and substances; the climatic conditions affecting soils and their handling; chemical composition and physical properties of soils; the use of mineral fertilizers and amendments; forests and woodlands, and their associated geological features; orchards, gardens, and vineyards; geological considerations concerning minerals and other economic materials; house sites, water supply, sewage, and drainage; and geological formations of England in their relation to the above subjects.

The object of the book is stated to be "to provide such information relating to the land-surface as will be useful to students and teachers of agriculture, to those occupied in the management of estates and farms, or in sanitary and engineering works, wherein it is important to consider the geological nature of different sites for residences and other purposes." Special emphasis is laid on the importance of a knowledge of the underlying formations in the study of soils. It is maintained that a soil map to be of most value must deal not only with the surface soil, but must take into account the subsoil and show the depth as well as the nature of the soil. "A map of the surface soils alone would give a very imperfect idea of the capabilities of the land. . . . A good subsoil map which shows the variations in the strata, whether drifts or the more regularly stratified formations, will always indicate the general distribution of the surface soils."

The germs of pedology in antiquity, A. JARILOW (*Internat. Mitt. Bohem., 3 (1913), No. 2-3, pp. 249-256*).—This article reviews the ancient ideas regarding biology and physics of soils.

Progress in agricultural chemistry (especially soil chemistry) since the use of the newer results of physical chemistry, especially colloid chemistry, H. BREHM (*Kolloid Ztschr., 13 (1913), No. 1, pp. 19-35*).—This article discusses in some detail the significance of colloid chemistry in relation to soils, mineralogy, and geology. The chief soil colloids enumerated are humus, slime organisms, colloidal iron and aluminum hydroxids, weathered amorphous silicates, and bacteria and micro-organisms held in suspension. The chemistry of colloidal humus in soils and the influence of lime and humus on the adsorptive power of cultivated soils are taken up in turn, followed by reviews of numerous works on the quantitative determination of soil and decomposed rock colloids.

It is thought that colloids play an important part in the exchange of bases when plant food is added to the soil by entering into the so-called adsorption combinations which are essentially different from ordinary chemical combinations. These colloidal cementing substances or adsorption combinations are

considered to be the food bearers of the soil. Too much or too little of the colloidal substances is said to impair the agricultural value of a soil.

The possibility of judging soils by their natural vegetation on the basis of the theory of probability, P. VAGELER (*Pflanzer*, 9 (1913), No. 4, pp. 171-184; *abstr. in Chem. Zentrbl.*, 1913, II, No. 4, pp. 378, 379).—From a mathematical demonstration, based on the assumption that the quantitative relations between soil and plants depend primarily on the physical properties of the soil, especially its hygroscopicity, it is concluded that the theory of probability combined with rigorous adjustment of the errors of probability is applicable for judging soils whose types of physical structure and plant forms lie within certain extreme limits established by actual test. This method was tested using hygroscopic values of some of the representative extreme soil formations of German East Africa, having correspondingly distinct vegetation.

It is concluded in general, from results obtained, that plant forms are regulated by those physical properties of the soil which regulate the hygroscopic water, and that under the same conditions of climate and with the same plant forms the same soil properties will appear with a regularity which will vary practically as indicated by the numerical probability error. It is further concluded that this method not only places the judging of soils by their characteristic vegetation on an exact numerical basis and reduces the number of actual tests, but offers a useful method for tracing soils in open plain areas.

Soil texture, C. T. GIMINGHAM (*Chem. World*, 2 (1913), No. 6, pp. 187, 188). The opinion is expressed that from all points of view the mechanical analysis serves as a good basis for the classification of soils, but that the results of such analysis can be of use only with a full knowledge of local conditions since the textures of identical soil types often vary from field to field. In this connection it is suggested that the percentage of shrinkage of soils on drying be determined.

White soil (Molkenboden), R. HORNBERGER (*Internat. Mitt. Bodenk.*, 3 (1913), No. 4, pp. 353-357).—The author reports his own and reviews other investigations on a rather impermeable grayish white soil, which he concludes is derived from sandstone but is somewhat poorer in soluble potash and lime and richer in phosphoric acid than an ordinary sandy loam derived from sandstone.

Marsh of the southern Vendée.—The influence of inundation on the fertility, G. CHARTRON (*Bul. Soc. Sci. Nat. Ouest France*, 3, ser., 2 (1912), No. 5-4, pp. 125-132).—In discussing the fertility of the soils of these flats it is stated that in the spring a kind of alga grows in the stagnant drainage water on the flats, forming a slime coating on the soil after the water has disappeared which is said to vary in amount from 214 to 1,158 lbs. per acre. Analyses of samples show considerable nitrogen and lime but relatively little phosphoric acid and potash. Analyses of soils from the surrounding slopes and of the drainage water lead to the conclusion that the fertility of the swamp soils is due more to the drainage water than to the slime.

Preliminary report on the soils of the wine district of Arad-Hegyalja and of the Arad plains, P. TREITZ (*Jahresber. K. Ungar. Geol. Reichsanst.*, 1910, pp. 214-243).—A discussion of geology and meteorology in their relations to the soil formations of these regions is followed by descriptions of the different types of soil encountered in both hill and plains country. The soils of the hill country are divided into soils rich in humus and iron, calcareous soils, brown forest soils, and podzol soils. The plain soils are discussed as sand and gravel soils, light brown and dark brown desert soils, prairie clay, and alkaline soils.

The soils of the rocky deserts of Turkestan, S. S. NESTSEV (*Pochvovedenie (Pédologie)*, 15 (1913), No. 1, pp. 1-13).—This article discusses in some detail the geological formations of the rocky deserts of Turkestan in their

relation to climate, vegetation, and soil formation. Analyses of some of the soils of these regions show large quantities of gypsum, less sodium sulphate, and some sodium chlorid. The quantity of sodium sulphate is said to be sufficient to limit the vegetation to desert plants. An abundance of gypsum is observed principally where excess moisture is contained in the soil. For this reason the salt deposits are said to be due to the evaporation of atmospheric water and not to subterranean waters, although the formation of underlying salt crusts under the influence of subterranean waters is frequent.

Tamar River soils, H. J. COLBURN (*Agr. and Stock Dept. Tasmania, Rpt. 1912-13, pp. 18, 19*).—Analyses of basaltic and nonbasaltic soils from the Tamar River Valley are reported with brief comments on their fertilizer needs.

Soil formation in clays of humid regions, B. FROSTERUS (*Internat. Mitt. Bodenk., 3 (1913), No. 2-3, pp. 99-130, figs. 11*).—Investigations of the physical and chemical composition of podzol soils found in clay soil deposits in swampy regions are reported. These included a study and comparison of the different layers of these soils and the conditions which determine their character.

It was found that in many cases two genetically different divisions exist in podzol soils, an upper and a lower. The upper part, which may be considered the podzol proper, is divided into two zones, one composed of layers of humus and of kaolin, the other composed of sedimentary earth and ortstein (hardpan) formations. These layers are formed by the leaching down of the soils from above. The kaolin layer is in an advanced state of weathering and is characterized by a high silica content. The layers of the second zone are especially rich in humus, clay and iron, and leachings of magnesia and alkalis.

The location and condition of the lower part of the podzol soil is determined by the ground-water level, and in some cases this influence extends to the surface soil, giving rise to the so-called ground-water soils. In localities where the ground-water level is high and where forest swamps are common such soils take an important place, replacing the true podzol soils. Where they lie near the surface they exercise a bad influence on plant growth. The true podzol formation is directly opposed to the ground-water soil formation.

The constituents of clay which impart plasticity and cohesion, A. ATTERBERG (*Internat. Mitt. Bodenk., 3 (1913), No. 4, pp. 291-330, figs. 2*).—In a report of extensive investigations of the causes of plasticity, toughness, and firmness of clays of northern and southern Europe the author defines plasticity, consistency, and stickiness as applied to clay, reviews the investigations and conclusions of other experimenters, and reports the results of his own tests of a large number of mineral samples and chemical preparations made to determine the principal plastic constituents in these clays. The minerals biotite, hematite, and limonite, and mixtures of hematite or limonite with kaolin showed typical clay plasticity combined with a high degree of toughness, as did also ferric oxychlorid (dialyzed iron).

Those minerals and preparations which appeared plastic showed a leafy or scaly structure from which it is concluded that the particles of leafy or scaly form impart plasticity to a mineral. A high degree of toughness was found in washed products of biotite, hematite, and limonite, as was also a high degree of firmness on drying in fine washed products out of the same materials. Since firmness was not found in all of these products it is concluded that a high degree of firmness is a property only of the scaly shaped particles of colloidal size.

Since the clays of northern Europe contain biotite in both oxidized and unchanged form it is generally concluded that colloidal biotite washings form their chief constituent and explain their high plasticity. The clays of southern Europe apparently owe their plasticity to their high content of hematite and limonite and mixed hematite or limonite with kaolin.

Comparative investigations of the cohesive power of different kinds of soils. H. PUCHNER (*Internat. Mitt. Bodenk.*, 3 (1913), No. 2-3, pp. 141-239, figs. 2).—The author describes methods and apparatus used and gives the results of tests of the cohesive power of a large number of soil samples from different depths.

A summary of results indicates that the samples tested showed wide variations in cohesive power, which in the great majority of cases was more marked in the upper strata of soil than in the deeper ones. Investigations on the effect of mechanical composition of soils on their cohesive power showed that coherence increased with a decrease of the coarse sand and an increase of fine silt. The coarser silt (0.01 to 0.25 mm.) increased cohesive power in coarse-grained soils with an excess of sand. On the other hand, too large a proportion of the coarser silt in fine-grained soils decreased the cohesive power. The sand separates of different grades (0.25 to 3 mm.) generally decreased cohesive power. The cohesive power of dry soils was affected to a considerable extent by chemical and biological influences as well as by the physical properties of the individual soil constituents.

Physico-chemical studies of soils.—II, The hygroscopicity of soils, U. PAROLONGO (*Staz. Sper. Agr. Ital.*, 46 (1913), No. 3, pp. 219-259, pls. 3, figs. 2).—In a systematic study of the hygroscopicity of six soils, it was found by physical and mechanical analyses and by a determination of variations in water vapor tension in the soil under fixed and variable temperatures that the physical and chemical structure as well as the humus content of the soils directly affected the processes of dehydration and rehydration.

Relation between the hygroscopicity and the chemical composition of certain Java soils, J. SCHUIJT (*Meded. Proefstat. Java-Suikerindus.*, 4 (1913), No. 10, pp. 225, 226, table 1, pl. 1; *Arch. Suikerindus. Nederland. Indie*, 21 (1913), No. 24, pp. 713, 714, pl. 1, table 1; *abs. in Chem. Abs.*, 7 (1913), No. 21, p. 3635).—By hygroscopicity of the soil is here understood the number of grams of water which 100 gm. of oven-dry soil absorbs in 14 days in vacuum over 10 per cent sulphuric acid. With such of the soils as had hygroscopicity of less than 10.5 there was remarkable regularity in that the moisture, the organic matter, the nitrogen, and the lime rose with the hygroscopicity and the phosphoric acid soluble in hydrochloric acid and that soluble in citric acid fell, while the potash dissolved by these two solvents first rose, then fell. With soils showing a hygroscopicity above 10.5 the same relation was observed in the first named constituents, while with the phosphoric acid and the potash there was less regularity.

Quantitative determination of the absorbed bases in the soil, D. PRISCHNIKOW (*Landw. Vers. Stat.*, 79-80 (1913), pp. 667-689, pl. 1, fig. 1; *abs. in Zentbl. Agr. Chem.*, 42 (1913), No. 5, pp. 296-298).—Under the assumption that soil constituents are in the form of available plant food only when in an absorbed condition, experiments were made to determine the efficiencies of ammonium nitrite, acetate, hydroxid, carbonate, and chlorid for determining the quantities of available potassium in soils. The nitrite showed a stronger reaction than the chlorid, but was considered unsatisfactory on account of its unstable character. In this respect the acetate and hydroxid gave better results than the nitrite, although the energies of reaction were about the same. The carbonate was less suitable on account of the organic matter in the soils.

For determining quantities of available ammonia four methods were compared, as already noted by Reschetnikov (*E. S. R.*, 28, p. 111).

A rich black soil, a loam, and a podzol soil were treated with ammonium nitrate to determine the quantity of absorbed lime. The rich black soil was

found to be fairly rich in lime while the other two were comparatively poor, especially the podzol.

In tests of certain potassium-containing silicates as sources of available potassium, biotite, muscovite, and nepheline when treated with ammonium chlorid and barium chlorid showed relatively large quantities of available potassium while orthoclase, sanidin, microclin, and leucite were very poor in this respect. However, it is stated that a quantitative comparison can not be made by these results since the different potassium silicates and zeolites are said to be in variable states of stability regarding potassium. An artificial sodium zeolite was treated with potassium and ammonium chlorides in order to get the corresponding potassium and ammonium zeolites. Pot tests with buckwheat of these and other silicates showed that the potassium in the zeolites, as also in the biotite and nepheline, was largely in available form, but this was not so when the zeolites were protected from contact and reaction with the other plant food salts, a strong fixation of the potassium being apparent. In this case the addition of calcium carbonate worked satisfactorily in converting the potassium compounds into available form as did also mixtures of the salts of other foods.

The so-called isolation method was used to test the effect of the various silicates when not in contact with other plant food compounds in the soil. In this method two concentric cylinders are used, the inner being much smaller and somewhat shorter than the outer. Some of the roots of the plant are placed in the inner cylinder which is filled with sand containing only the silicate to be tested. The rest of the roots are allowed to grow in the sand which fills the outer cylinder to the top and is supplied with all necessary elements of plant food except that added to the inner cylinder. The top of the latter is closed so that there is no interchange of plant food between the cylinders. In this way the plant was forced to draw its potash supply from the silicate in the inner cylinder without the aid of the solvent action of other fertilizing substances.

Experimental investigations on the question of precipitation of iron in podzol soils, R. AARNIO (*Internat. Mitt. Bodenk.*, 3 (1913), No. 2-3, pp. 131-140).—Experiments made to determine the movements of iron in podzol soils showed that it moves in such soils in ferrous forms reduced from ferric salts by humus solutions and as iron colloid solutions in soil solutions which are poor in electrolytes and show a high humus content, as is the case in sandy podzol soils. The iron sinks into the deeper layers of such soils and forms ortstein when conditions are favorable for precipitation. It is also shown that iron can be precipitated by electrolytes, of which sulphuric acid and silicic acid are the most prevalent in this soil, and by colloidal silicic acid and humus. The electrolytes and colloids are said to effect precipitation only within fixed limits of concentration of the solution to be precipitated. The colloid iron is said to diffuse through the upper part of the soil and is there precipitated by humus and electrolytes. This explains the presence of so much iron in the upper layers of podzol soils.

Iron in the ground water in the form of salts of mineral acids rises through capillarity and is precipitated in the upper layers of the soil.

Work of the chemical laboratory of the Ploti Experiment Station, 1912. S. SKALSKIĖ (*Godichnyi Otchet Ploti. Sel'sk. Khoz. Opytn. Stantsii*, 18 (1912), pp. 133-227, 349-380, pls. 3).—The work reported included bacteriological as well as chemical studies of the soil. The intensity of the process of the fixation of nitrogen in the soil under different cultural conditions; the intensity of the processes of nitrification and denitrification in tilled and untilled fallow; and the conversion of easily soluble phosphoric acid into insoluble form under the influence of chemical and microbiological factors were studied in field and

laboratory. In addition, a series of cropping experiments was conducted to determine (1) the influence of sterilized soils on the development of plants and (2) the proportions of nitrogen and phosphoric acid most favorable for plant development. Studies were also made of the relation of nitrogen and phosphoric acid to soil fertility.

The fixation of nitrogen by soil bacteria was found to depend on the cultural condition of the soil, the intensity of the process increasing with the degree of culture. It was higher in spring (tilled) fallow soil than in untilled, and higher in the surface soil than in the subsoil of all the soils tested.

Determination from time to time of nitric nitrogen in soil and subsoil indicated that the intensity of nitrification was much less in the cultivated top soil than in the subsoil of both tilled and untilled fallow except for a few days at the beginning of the tests, while the opposite was true of denitrification. Studies of the processes of nitrification and denitrification in identical samples of soil, however, indicated that when conditions were made favorable in the soil for the growth and activity of nitrifying bacteria a medium was formed with the resulting nitrates which was favorable to the growth and activity of denitrifying bacteria which in turn destroyed the nitrates already formed. It was further found that some of the nitric nitrogen formed was converted into albuminoids or into gaseous nitrogen. Some of the latter may be fixed by nitrogen-fixing organisms and pass into complex organic forms.

In addition to the results obtained in the preceding year in regard to the chemical and microbiological fixation of soluble phosphoric acid (E. S. R., 28, p. 417) it was found that the fixation of easily soluble phosphoric acid depends as much on chemical as on biological factors, and the intensity of this process depends directly on the cultural condition of the soil. The total fixation through both chemical and microbiological factors was found to be greater in subsoils than in cultivated top soils as was also the case where the fixation was due to chemical factors alone, but when due to microbiological factors alone the intensity was found to be the greater in the top soil.

Sterilization of soils with chloroform and with heat, as previously noted, increased the crop yield by converting the phosphoric acid and nitrogen into available forms. The crop yield increased with the nitrogen added; but with increased phosphoric acid there was first an increase, then a decrease. Increasing both fertilizers slightly increased the crop.

Fallow soil was found to be in the best physical and chemical condition, and phosphoric acid was more needed as a fertilizer in this soil than nitrogen, although both are considered indispensable in raising the soil to a high degree of fertility.

Bacterial action in the soil as a function of food concentration and of insoluble organic substance, Q. RANS (*Centbl. Bakt. (etc.)*, 2, *Abt.*, 38 (1913), No. 19-20, pp. 484-494).—This work is a continuation and completion of studies previously noted (E. S. R., 23, p. 817), and is devoted chiefly to a study of the influence of porous spongy substances, such as cellulose, on bacterial activity in soils. Cellulose in the form of finely grated filter paper was mixed with sand, washed with hydrochloric acid, in different proportions. These mixtures and likewise sand without cellulose were moistened with a 5 per cent peptone solution, and a peptone solution without sand addition was also used in each series. These different combinations were sterilized in the autoclave and inoculated with a culture of *Bacillus mycoides*. The cultures were analyzed after 2, 4, 6, 10, and 20 days' incubation and the progress of decomposition and the different speeds of transformation in the individual combinations noted. The influence of the concentration of peptone and of variations in water content and of cellulose on the ammonification are specially noted.

From the results obtained it is concluded that the bacterial activity in soil depends on the size of soil grains, the water content, and the concentration of food. The speed and the final stage of decomposition vary with these three factors.

In order to obtain physiologically comparable results it is shown that the soil solution must contain the same food concentration in all experiments, which does not correspond with conditions in cultivated soil. With the same food concentration in the soil the decomposition of some substances shows approximately under all conditions the same final point of cleavage, so that only the speed of decomposition and not the final stage is influenced by the size of grain and water content. This was found to be the case in the decomposition of peptone by *B. mycoides*. However, with other bacteria in previous experiments the speed of decomposition and also the point of final decomposition were influenced by the physical properties of the soil.

Coarse spongy organic substances, such as decomposed cellulose, acted in dry soils as water absorbers and diminished the bacterial action, but in moist soils they increased ventilation and thereby increased the activity of aerobic bacteria.

Occurrence of *Azotobacter* in tropical soils, J. GROENEWEGE (*Meded. Proefstat. Java-Suikerindus.*, 4 (1913), No. 13, pp. 241-244; *Arch. Suikerindus. Nederland. Indië*, 21 (1913), No. 26, pp. 790-793; *abs. in Chem. Abs.*, 7 (1913), No. 21, p. 3635).—Contrary to the conclusions of De Kruijff, the author found *Azotobacter chroococcum* in all but one of a series of Java soils, and in this the chlorine content was 3.86 per cent, indicating sufficient sodium chlorid to kill the bacteria. *Bacillus radiobacter* was also found to be generally present in Java soils.

Methods in soil bacteriology.—VI, Ammonification in soil and in solution, F. LÖHNIS and H. H. GREEN (*Centbl. Bakt. [etc.]*, 2, *Abt.*, 37 (1913), No. 22-23, pp. 534-562; *abs. in Jour. Chem. Soc. [London]*, 104 (1913), No. 609, I, pp. 737, 798; *Chem. Abs.*, 7 (1913), No. 19, pp. 3330, 3331).—This is a critical study of the factors affecting ammonification and nitrification of blood meal, flesh meal, and horn meal under laboratory conditions. It is considered that in determining the relative value of laboratory tests in soil and solution media the specific mode of application of methods must be clearly defined, since widely varying results may be obtained in both cases according to variation in the experimental conditions. "The most significant cause of variation appears to be that of aeration."

Ammonification, as well as nitrification, proceeded much more rapidly under aerobic than under anaerobic conditions. It is believed that aerobic conditions especially favor the later stages of breakdown resulting in the formation of ammonia itself. Under conditions of insufficient aeration, increasing the quantity of nitrogenous material used retarded the ammonification, but with adequate aeration it had little influence. In general smaller quantities of material experienced more complete ammonification although the chemical nature of the material used seemed to be the dominant factor. The duration of the experiment affected the apparent extent of ammonification, the rate of ammonification being in general greatest during the first ten days in both soil and solution. The three materials used showed very different rates of decomposition.

In solution tests the losses of ammonia by evaporation were highest and the relative extent of ammonia assimilation lowest with the larger quantities of material. In these tests the use of magnesium hydrogen phosphate effected marked conservation of ammonia only in the longer periods of decomposition. However, the ammonia not lost through evaporation was assimilated by the

bacteria. In solution tests the depth of liquid was found to be the chief factor in controlling aeration, while in soil tests the depth of soil layer and the degree of moisture exercised relatively little effect within comparatively wide limits. However, where the depth of the soil layer interferes with aeration marked differences are said to appear.

In solution nitrification was not observed in the presence of the three materials used, while in soil tests with liberal aeration and not too large an excess of ammonia it kept pace with ammonification. There was accumulation of ammonia with the larger quantities of material but not with the smaller. In the longer periods the ammonia accumulated during the earlier stages was partly nitrified and partly lost by evaporation. With inadequate aeration there was no formation of nitrate.

The metabolism of flesh meal proceeded almost as fast in solution as in soil, while horn meal and blood meal decomposed much more rapidly in soil.

Nitrate and nitrite assimilation. O. BAUDISCH (*Ztschr. Angew. Chem.*, 26 (1913), No. 85, Aufsatzteil, pp. 612, 613).—The author attempts to show in this article that the nitroxyl group plays an important rôle in nitrogen changes in green plants, and discusses the ways in which this is done.

Studies on the decomposition of cellulose in manures and soils. C. MÜTTERLIX (*Studien über die Zersetzung der Zellulose im Dünger und Boden.* [Inaug. Diss.] Leipzig, 1913; abs. in *Centbl. Bakt.* [etc.], 2. Abt., 39 (1913), No. 4-7, pp. 167-169).—The work of other investigators on this subject is reviewed and a series of experiments with different culture media and various inoculating materials is reported.

The effect of toluol and CS₂ upon the micro-flora and fauna of the soil. P. L. GAINES (*Missouri Bot. Gard. Ann. Rpt.*, 23 (1912), pp. 147-163; abs. in *Centbl. Bakt.* [etc.], 2. Abt., 39 (1913), No. 4-7, p. 158).—The results of the investigations reported in this article are summarized as follows:

"(1) Small quantities of CS₂, toluol, and chloroform, such as have been used practically and experimentally, when applied to the soils studied exert a stimulative rather than a diminishing effect upon the total number of bacteria present.

"(2) An application of such quantities of CS₂ and toluol does not have an appreciable effect upon the number of types of protozoa present in such soils as have been studied.

"(3) A very marked increase in yield may be noted following such an application when no evident change occurs in total number of bacteria present.

"(4) In the light of the recent work of Koch, Egorov, Goodsey, Fred, and others, with results presented in this paper, the theory advanced by Russell and Hutchinson to account for the increased yield following the application of such chemicals appears not tenable for general application."

The influence of fertilization on the condition of the soil and its fitness for certain crops. A. MATSBERG (*Landw. Jahrb.*, 45 (1913), No. 1, pp. 29-101).—Studies conducted for 18 years on the relations between the properties of a soil and its fertilization and productiveness are reported, and methods of physical, mechanical, and chemical analyses, and of eliminating errors are reviewed. The tested soil was originally a medium heavy, deep loam, mostly fine grained, with a hygroscopicity of about 2.98 per cent and an absorption coefficient for ammonia of 72.5 mg. It contained relatively small quantities of plant food, although needing only moderate potash and very little phosphoric acid fertilization.

In experiments made to determine the influence of varied fertilization on the physical, mechanical, chemical, and biological properties, it was found that soil

not fertilized for a long period became rather dense in structure, suffered during drought, became saturated and sticky during wet weather, dried very slowly, and showed little useful bacterial activity. Its alkalinity was also low.

Continuous treatment with either sodium nitrate or kainit produced a dense, crusted structure and reduced the basicity and the useful bacterial action. Continued ammonium sulphate treatment had a detrimental effect on the soil reaction and bacterial activity. Continuous lime treatment produced all the characteristics of high fertility, with the exception of impoverishment in potash, as did also the magnesia treatment to a little less degree.

Complete fertilization without lime produced results in no way inferior to those produced by continuous lime treatment. There was a most marked exhaustion of potash with complete fertilization except potash. Mixed fertilization with stable manure, mineral phosphates, and potash produced only a medium physical structure and somewhat better bacterial activity, but reduced the alkalinity.

Rye, oats, peas, potatoes, and sugar beets were grown on differently fertilized plots. Winter rye appeared to thrive on all the soils regardless of fertilization, little difference being observed on different plots. Oats required an excess of easily assimilable nitrogen, which it preferred as sodium nitrate. Aside from nitrogen the oats required sufficient potash.

For a good yield of peas, both potash and lime were necessary, the absence of either causing the same shortage in yield as the absence of both. Potatoes thrived best with plenty of potash, and preferred ammonium sulphate to sodium nitrate as a source of nitrogen. A change in soil reaction affected them but little, as complete fertilization without lime and with magnesia did not decrease the yield. The highest yield of potatoes was obtained with mixed fertilization of stable manure, mineral potash, and phosphate fertilizers in spite of the low alkalinity of the soil.

For a good yield, sugar beets required each of (1) easily assimilable nitrogen, (2) sufficient potash, (3) high alkalinity in connection with a satisfactory soil structure, and the yield decreased in proportion to the deficiency of any of these three. The beets stood in direct contrast with potatoes, since, in spite of the presence of magnesia, they were badly affected by a deficiency of lime and preferred sodium nitrate to ammonium sulphate as a source of nitrogen.

Fertilization had a more lasting influence on the starch content of potatoes than on the sugar content of beets, but although both depended largely on potash, an excess of this reduced the quality of the potatoes and improved that of the beets. Phosphoric acid had little effect on the yield of either, but ammonium sulphate increased the carbohydrate formation in both.

Experiences with commercial fertilizers and manure, W. LONERGAN (*Ann Rpt. Nchr. Corn Improvers' Assoc.*, 4 (1913), pp. 85, 86).—Experiments with manure and fertilizers on a good clay upland soil in Nebraska led to the conclusion that the use of manure was superior to all other treatments, and that there was little or no advantage in the use of commercial fertilizers on such soils.

Fertilizer experiments on peaty meadows in Hungary, J. GYÁRFÁS (*Közlöleték [Budapest]*, 23 (1913), No. 48, pp. 1553, 1554; obs. in *Internat. Inst. Agr. [Rome]*, *Mo. Bul. Agr. Intel. and Plant Diseases*, 4 (1913), No. 8, pp. 1194, 1195).—Cooperative experiments in different parts of Hungary showed in general that the use of a fertilizer containing phosphoric acid and potash gave highly remunerative results.

The results of experience with fertilizers during the last twenty-five years. LEMPMERANN (*Illus. Landw. Ztg.*, 33 (1913), No. 48, pp. 450, 451).—This is a brief review of German experience and shows that the free use of fertilizers

has been a large factor in increasing agricultural production in that country. In fact, 50 per cent of the increase, which has been very pronounced, is attributed to the rational use of fertilizers.

Bone products and manures, T. LAMBERT (*London, 1913, 2. rev. ed., pp. VII+167, figs. 17*).—This is a second revised edition of this work (E. S. It., 13, p. 634).

The solubility of soil constituents, H. FISCHER (*Internat. Mitt. Bodenk., 3 (1913), No. 4, pp. 331-337, fig. 1*).—In a comparison of the solubility of phonolite and biotite in water saturated with carbon dioxide according to the Miescherlich method it was found that the potash of the latter was less soluble than that of the former. This, however, is not in accord with results of crop tests by other investigators which showed that the potash of biotite is more readily assimilated by oats than that of phonolite. Methods of rendering the potash of phonolite more assimilable by plants are briefly discussed.

Comparative manuring experiments with crushed phonolite and 40 per cent potash salts, F. WAGNER (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 11 (1913), Nos. 4, pp. 52, 53; 5, pp. 67-70; 6, pp. 77-82, fig. 1; abs. in Internat. Inst. Agr. [Rome], Mo. Bul. Agr. Intel. and Plant Diseases, 4 (1913), No. 10, pp. 1534, 1535*).—Ground phonolite was compared with 40 per cent potash salt on hops grown on soils poor in potash. The phonolite was used in connection with a basal fertilizer of ammonium sulphate, Thomas slag, and lime, but the results from its use were in no way comparable with those obtained with the potash salt.

The possibility of replacing Stassfurt potash salts by finely ground phonolite, leucite, etc., LEMMERMANN (*Internat. Inst. Agr. [Rome], Mo. Bul. Agr. Intel. and Plant Diseases, 4 (1913), No. 10, pp. 1484-1495*).—Experiments with various natural silicates of potash are reviewed.

It is shown that the fertilizing effect of these is variable, but generally low. They are not comparable with potash salts. Various processes which have been proposed for the improvement of their assimilability are noted, but it is held that none of them offers a practical substitute for the German potash salts.

Influence of the condition of the soil on the utilization of different phosphates, H. R. CHRISTENSEN (*Fühling's Landw. Ztg., 62 (1913), No. 11, pp. 392-405*).—Experiments are reported which were conducted to determine the relative values of superphosphate, Thomas slag, bone meal, and Algerian phosphate fertilizers under varying conditions of cultivated and meadow soils, the variable factors being the power of the soils to set free acids, especially phosphoric acid, the moisture content, and the basicity.

On cultivated soils the effects of the superphosphate and Thomas slag were uniformly good, and both were utilized in practically the same quantities in acid and basic soils, the Thomas slag being utilized slightly the more. Using superphosphate as a standard, the results with bone meal and Algerian phosphate were poor. With a single exception it was found that the utilization of the phosphoric acid of bone meal as compared with that of superphosphate was very small, in basic soils, while in nonbasic and acid soils the two were utilized to about the same extent. No definite relations were found to exist between the acid separating powers of cultivated soils and the utilization of the four phosphates.

In meadow soils superphosphate was utilized to a somewhat greater extent than Thomas slag, the utilization of Thomas slag being greatest in the basic soils. Bone meal, with one exception, was not utilized so well as superphosphate. Better utilization of bone meal was found on moist than on dry soils with greater acid separating powers. The effect of basicity on bone meal was not so marked as in the cultivated soils.

It is concluded that the utilization of slowly soluble phosphates is largely regulated by the amount of water present in the soil during the growing season, being greater in moist than in dry soil, and also that bone meal can not be satisfactorily used on basic soils. Although little tested, Algerian phosphate is classed with bone meal.

Origin of the hard rock phosphates of Florida, E. H. SELLARDS (*Fla. Geol. Survey Ann. Rpt.*, 5 (1912), pp. 23-80, pls. 10).—The nature and location of the hard rock phosphate deposits are described and theories of their origin are discussed.

As regards the origin of these deposits the author holds "that the matrix of the hard rock phosphate deposits is the residue of the formations that have disintegrated in situ, and that the phosphate itself is derived from the phosphate originally widely disseminated through these formations, circulating waters being the agency by which the phosphate has been carried to its present location."

An extensive bibliography of the subject is given.

Production of phosphate rock in Florida during 1912, E. H. SELLARDS (*Fla. Geol. Survey Ann. Rpt.*, 5 (1912), pp. 291-294).—The statistics of production of different kinds of phosphate rock in Florida in 1912 and several preceding years are summarized. A list of phosphate manufacturing companies operating in the State during that year is also given.

Consumption of superphosphates in Hungary, B. KOVÁCSY (*Közelepek [Budapest]*, 23 (1913), No. 42, pp. 1532, 1533; *abs. in Internat. Inst. Agr. [Rome]*, Mo. *Bul. Agr. Intl. and Plant Diseases*, 4 (1913), No. 8, p. 1201).—The data reported show a marked increase in the consumption of commercial fertilizers especially superphosphates, which constitute 80 per cent of the total amount of chemical fertilizers employed. The use of superphosphate varies from 1 to 72 lbs. per acre of cultivated area in different parts of the country.

Calcium pyrophosphate, A. MENOZZI (*Indus. Chim.*, 13 (1913), pp. 261, 262; *abs. in Jour. Soc. Chem. Indus.*, 32 (1913), No. 19, p. 853).—When phosphorite was heated with moist sulphur dioxide in presence of air there was obtained a fine white powder consisting of calcium sulphate and pyrophosphate. The properties of this product are described and it is stated that it is as effective as a fertilizer as superphosphate or basic slag. It is not proposed, however, that it be used as a fertilizer in this form, but that it be converted into superphosphate by treatment with sulphuric acid. By this treatment a product is obtained which is of lower acidity than ordinary superphosphate.

The degree of fineness of fertilizer lime, D. MEYER (*Illus. Londic. Ztg.*, 33 (1913), No. 84, p. 755).—The author concludes from the examination of a large number of samples of agricultural lime that not less than 70 per cent of such lime should pass a sieve with meshes 0.2 mm. in diameter, and that not more than 75 per cent of the particles passing a 0.5 mm. sieve should be larger than 0.2 mm. in diameter. The particles larger than 0.5 mm. but smaller than 1 mm. should not exceed 25 to 50 per cent.

Evolution of sulphur in the soil: A study of its oxidation, C. BÉRIOT and M. GUERBET (*Compt. Rend. Acad. Sci. [Paris]*, 156 (1913), No. 19, pp. 1476-1479; *Ann. Sci. Agron.*, 4, ser., 2 (1913), II, No. 4, pp. 385-396; *abs. in Rev. Sci. [Paris]*, 51 (1913), I, No. 21, p. 668; *Jour. Chem. Soc. [London]*, 104 (1913), No. 609, I, p. 811; *Chem. Zentbl.*, 1913, II, No. 4, p. 379).—The author studied the influence of the character of the soil and of certain carbohydrates on the oxidation of sulphur.

Sugar and starch appreciably retarded oxidation, while peptone and other nitrogenous substances favored it to such an extent that 82 per cent of the sulphur was oxidized in 30 days. The oxidation of the sulphur was due to

a very complicated bacteriological process probably involving a number of different kinds of bacteria. The addition of calcium carbonate greatly accelerated oxidation, but sterilization almost entirely prevented it.

The composition of sediments from the Potomac and Shenandoah rivers. J. G. SMITH and W. H. FAY (*Jour. Indus. and Engin. Chem.*, 5, 1913, No. 12, pp. 1009-1011).—Mineralogical and chemical analyses of a large number of samples of the sediments are reported.

The mineralogical character of the sediments of the two rivers was decidedly different. The chemical analyses showed no definite relation between the composition and the amount of sediment carried by the streams when the samples were taken, and no uniformity of chemical composition of the sediments as a whole. It was found, however, that the fine particles were comparatively high in potash, phosphoric acid, lime, organic matter, etc.

The production and consumption of chemical fertilizers in the world (*Production et Consommation des Engrais Chimiques dans le Monde*. Rome: Inst. Internat. Agr., 1913, pp. VI+137, pls. 67 text; in *Jour. Soc. Chem. Indus.*, 32 (1913), No. 15, pp. 801, 802).—This report gives detailed statistics as far as they are available of the production of raw materials supplying phosphoric acid, potash, and nitrogen in fertilizers, and of the consumption of commercial fertilizers in 62 different countries, with a statement of the sources from which the information was drawn.

It is estimated that the value of the fertilizers at present consumed in the world exceeds \$100,000,000. The average consumption is stated to exceed 178 lbs. per acre of cultivated area in Belgium, Mauritius, and Luxembourg, and to vary from 89 to 178 lbs. in Germany and the Netherlands; from 45 to 50 lbs. in Denmark, United States (southern States), France, England, Australia, Italy, and Switzerland; from 9 to 45 lbs. in Austria, Hungary, Spain, United States (northeast), Norway, Dutch East Indies, Portugal, and Sweden. "All the remaining countries consume less than 9 lbs. per acre or an unknown amount." As a rule the latest figures given are those for 1911.

Commercial fertilizers and their importance in the world's industry. K. KUMFASCHKY (*Ztschr. Angew. Chem.*, 26 (1913), No. 97, Aufsatzteil, pp. 721-729, fig. 1).—A historical and general review of this subject, based in part upon the report noted above.

AGRICULTURAL BOTANY.

Department of botanical research, D. T. MacDougal, (*Carnegie Inst. Washington Year Book*, 11 (1912), pp. 49-76, pl. 1).—An outline is given of the work carried on by the members attached to the laboratories maintained by this institution and of investigations carried on under its auspices. These include studies on phyto-chemistry, the water relations of plants, and the environic reactions of organisms. Among some of the lines of work more or less briefly reported upon are the alterations in woody tissues and bacterial action in Salton water, the behavior of micro-organisms in brines, the floral elements of the Salton region, physical and botanical features of Sudanese and Libyan deserts, botanical features of the Algerian Sahara (E. S. R., 29, p. 625), depth of water table as a factor limiting distribution of trees, the soil moisture evaporation index and its relation to vegetation, water relations of plants, physical relations of roots to soil factors, structural relations in xenoparasitism (E. S. R., 28, p. 322), the determination of leaf temperatures, and chemical effects of radiant energy in plant processes.

A bibliography is appended.

Origin of species by mutation. A. W. SUTTON (*IV. Conf. Internat. Génétique Paris, Compt. Rend. et Raps.*, 1911, pp. 153, 159; *abs. in Bot. Centbl.*, 123 (1913), No. 10, p. 247).—The author states that observations extending over 40 years have convinced him that, while permanent variations may appear and retain their distinctive characteristics when isolated and grown (some being, however, only fluctuating variations tending soon to lose their identity), there is nothing approaching a really new species which has arisen by so-called mutation in the plants observed.

On the principle of the coalescence of living plasmas and the origin of races and species. A. GAUTIER (*IV. Conf. Internat. Génétique Paris, Compt. Rend. et Raps.*, 1911, pp. 79-90, fig. 1; *abs. in Bot. Centbl.*, 123 (1913), No. 9, pp. 214, 215.)—The author sums up the results of studies extending over some years.

Observations on cross-fertilization, grafting, etc., are claimed to show that somatic plasma possesses a property similar to that of the germ plasma, namely the power to transmit to the bud and to the ovary of the plant a modification which is immediately apparent and which in some cases may be transmitted to the offspring. The step from one race or species to another corresponds to a modification of the chemical principles essential to the race or species, this chemical differentiation being the sign of a corresponding variation in the protoplasm, resulting in a sudden alteration of function, of product, and of growth as regards external form. The coalescence of vegetable or somatic plasma may be as effective as that of germ plasma in the production of new races, uniting species and even genera. The stimulus may originate from insects, microbes, etc., acting directly or indirectly toward these results.

The author concludes that it is by the union or symbiosis of plasmas, sexual or somatic, resulting from fertilization, grafting, or parasitic or traumatic action, that, either modifying the relation of certain ferments or preventing their formation, gives rise to those abrupt changes by which new races or species are produced; and that the variations of the individuals and of the races thus formed do not transgress the limits beyond which analogy with anatomical structures or with specific chemical principles no longer exists.

Studies of natural and artificial parthenogenesis in the genus *Nicotiana*. R. WELLINGTON (*Amer. Nat.*, 47 (1913), No. 557, pp. 279-306; *abs. in Internat. Inst. Agr. [Rome], Mo. Bul. Agr. Intcl. and Plant Diseases*, 4 (1913), No. 7, p. 1939).—The author reports several hundred attempts with stimuli caused by foreign pollen, mutilations, fumigation, and infections on numerous species and varieties of *Nicotiana* to produce parthenogenesis in the seed without success and concludes that it probably does not occur in the forms tested.

An extensive bibliography is given.

Periodicity of specific characters. P. VUILLEMIN (*Bul. Soc. Sci. Nancy, 3^e ser.*, 13 (1913), No. 3, pp. 179-218, figs. 13).—The author concludes an account of studies made by him on morphology in different stages, as noted in a number of plants, by stating that various forms of polymorphic plants or organs thereof may appear in a determinate order, which fact requires in such cases that these successive characters be employed to give a complete definition of the species. It is admitted that this habitual periodicity may be interfered with by external agencies, but it is still held that those teratological characters which exhibit periodic polymorphism are to be regarded as specific.

Biology and radio-activity. G. PETIT (*Rec. Méd. Vét.*, 90 (1913), No. 17, p. 534-590, figs. 2).—Besides brief mention of some work by other investigator an account is given of recent studies by the author regarding the influence of radio-activity on rye grass, wheat, and corn. Some experiments on the latter named showed a striking acceleration of growth, the results in general con-

firming previous conclusions reached by the author in connection with Ancelin (E. S. R., 25, p. 326).

The determination of the rays concerned in chlorophyll synthesis, P. A. DANGEARD (*Botaniste*, 12. ser., 1912, pp. XXI-XXVI; *abs. in Ann. Bot. [Rome]*, 11 (1913), No. 3, pp. 591, 592).—The author investigated further (E. S. R., 25, p. 221) the influence on chlorophyll synthesis of the different portions of the spectrum obtained from a Nernst lamp, employing in these later experiments a quartz prism.

It is stated that there exists a direct relation between the growth of a green alga and the absorption of radiations by its contained chlorophyll, the maximum effect appearing between the lines of wave length 690 to 670. The rate of absorption of chlorophyll in solutions by an alga or its rate of vegetative development therein corresponds closely to the concentration employed. Notwithstanding considerable absorption of xanthophyll below line 490, the energy absorbed is insufficient to cause chlorophyll synthesis in that part of the spectrum. It is also claimed that blue and violet rays do not appear to have any important influence on chlorophyll synthesis.

New observations on chlorophyll assimilation and reply to recent criticisms, P. A. DANGEARD (*Bul. Soc. Bot. France*, 60 (1913), No. 2-3, pp. 166-175).—Referring to results obtained from work above noted and calling attention to observations of other investigators, the author replies to certain objections offered to his previous conclusions.

Two years' experiments with static electricity as related to the growth of cultivated plants, P. TRNKA (*Zemědělský Arch. [Arch. Bodenkult. Bohmen]*, 4 (1913), No. 1; *abs. in Bot. Centralbl.*, 123 (1913), No. 6, p. 143). The author gives an account of experiments in which insulated wire nets stretched at a height of 4 or 5 meters above 36 hectares of growing beets were subjected to an electric current of from 50,000 to 70,000 volts and 0.7 to 0.8 milliamperes for 1468 hours in 223 days of 1911, and 2,000 hours in 229 days of 1912.

The production of the field was sensibly increased, but the question as to the profitability of the treatment was not fully settled. Differences in chemical composition were noted, both during the growing period and after maturity. These increased yields appear not to be explainable as due to differences in transpiration, stimulation, or assimilation processes, and this fact leads to the supposition that the electricity exerts its direct influence upon the soil rather than upon the plant. This mode of culture is thought to be better suited to plants having large assimilation surfaces.

On the growth of plants in partially sterilized soils, E. J. RUSSELL and F. R. PETHERBRIDGE (*Jour. Agr. Sci. [England]*, 5 (1913), No. 3, pp. 278-287, *pls. 4, fig. 1*).—For a number of years experiments have been in progress in growing plants in partially sterilized soils, and some of the observed facts are placed on record. The partial sterilization was effected by the use of toluene and by heating to 55 and 100° C.

The germination of seeds planted in these soils was sometimes hastened, at other times retarded. Retardation was almost always produced in soils heated to 100° or treated with toluene, while acceleration often followed the planting of seeds in soils heated to 55°. The retarding effect was generally more pronounced in moist than in dry soils and in rich than in poor ones.

In the seedling stages the plants produced on partially sterilized soils were sometimes indistinguishable from those on untreated soils. Seedling tomatoes grown on heated soils in comparison with those grown on untreated ones had smaller roots and smaller cotyledons of a darker green color, frequently showing some purple. The effect on the seedlings was most pronounced during the dull days of winter, and this has a practical application in the use of partial

sterilization for the growth of plants under glass. Later marked differences were shown, the purple color disappeared, and the plants began to show remarkable growth.

Sometimes soils treated with toluene behaved like those heated to 55°, but on rich soils early development was retarded. Other volatile antiseptics were found to behave like toluene.

Comparing partially sterilized with untreated soils, the authors found that there was generally a retardation in germination, although sometimes partial acceleration occurred. An acceleration in growth followed up to the time of the appearance of the third or fourth leaves, but sometimes a marked retardation was noticed, especially in rich soils heated to 100°. Where this retardation occurred it was accompanied by a very dark green leaf color and either the formation of a purple pigment or a tendency for the leaves to curl toward the underside. Later the purple color disappeared, the curling ceased and rapid growth took place. The subsequent growth was finally proportional to the amount of food present. Plants grown on soils heated to 100° showed a remarkable development of fibrous roots, and, in comparison with those on untreated soils, had larger leaves of a deeper green color, stouter stems usually shorter internodes, flowered earlier and more abundantly, and contained a higher percentage of nitrogen and sometimes of phosphoric acid in their dry matter. Plants grown on soils heated to 55° or treated with volatile antiseptics showed fewer of these effects.

Considering the chemical differences in the soils, it is stated that partially sterilized soils are characterized by an accumulation of ammonia, while untreated soils contain practically no ammonia. Soils heated to 100° are characterized by the presence of decomposition products, some of which possess characteristic colors and odors.

The authors present the data upon which their paper is based and give an extended discussion of their observations.

Some organic constituents of the culture solution and the mycelium of molds from soil, M. X. SULLIVAN (*Abs. in Science, n. ser., 38 (1913), No. 984, p. 678*).—An examination was made of the dried mycelium of mixed mold cultures from soil, of *Penicillium glaucum* grown on Raulin's solution, and of the filtered solution after a mold growth to determine the various organic constituents.

In the mixed molds a large number of organic substances were found, many of which were subsequently recognized in *P. glaucum*. In the alcoholic soda extract of *P. glaucum* the author found oleic and palmitic acids, a fatty acid melting at 54° C., a fatty acid which appears to be elaidic acid, hypoxanthin, guanin and adenin, histidin, thymidin, and chlorin. In the direct alcohol extract, mannite, cholesterol bodies, hypoxanthin, and cerebrosids were found. Guanidin was determined from mold grown on Raulin's solution, to which peptone in small quantity was added. In the culture solution after a number of weeks' growth were found fatty acids, purin bases, a small quantity of a histidin-like body, pentose sugar, unidentified aldehydes, etc. Many of these compounds have been found in soil, and the conclusion is drawn that micro-organisms, such as yeast, bacteria, and molds, play an important part in their formation.

Polyatomic alcohols as sources of carbon for molds, R. E. NEWMAN (*Abs. in Science, n. ser., 38 (1913), No. 984, p. 675*).—A comparison was made of methyl alcohol, glycol, glycerol, erythrite, adenite, mannite, dulcitol, and sorbitol to determine their availability as sources of carbon for 8 species of molds representing 4 genera.

It was found that methyl alcohol produced no growth, glycol induced germination only, glycerol produced strong cultures, erythrite could be used by the

majority of molds, and adonite by only a few. All 3 of the hexatomic alcohols may be considered good sources of carbon.

The influence of starch, peptone, and sugars on the toxicity of various nitrates to *Monilia sitophila*. O. KUNKEI (*Bul. Torrey Bot. Club*, 40 (1913), No. 11, pp. 625-639).—Studies were made to determine whether or not the toxicity of various salts to *M. sitophila* is influenced by sugars, starch, or peptones.

The results show beyond question that the concentration at which the various inorganic salts are toxic depends on the kind of organic substance contained in the media to which those salts are added. The degree of toxicity of the nitrates of barium, aluminum, iron, and urea depends on the organic substance contained in the media in which these salts are offered. Barium nitrate is more toxic in peptone than in starch media, while iron and aluminum nitrates are more toxic in starch than in peptone media. The toxicity of iron nitrate is approximately the same in starch as in other carbohydrates, but it is much less toxic in peptone media. Urea nitrate was found to be four times more toxic in starch than in peptone media.

On the effect of chloroform on the respiratory exchanges of leaves. D. THODAY (*Ann. Bot. [London]*, 27 (1913), No. 108, pp. 667-717, figs. 15).—The author made a study to determine whether a close quantitative relation exists between the evolution of carbon dioxide and the absorption of oxygen under the influence of stimulating agencies. Sunflower, garden nasturtium, cherry laurel, etc., were subjected to the effect of chloroform, and in all the leaves examined treatment with a small dose of chloroform resulted in a stimulation of the respiration, and the absorption of oxygen and production of carbon dioxide apparently remained coordinated. When the concentration of chloroform vapor was large enough to bring about visible disorganization, the production of carbon dioxide was diminished and the absorption of oxygen was no longer closely correlated with the production of carbon dioxide.

In leaves of the nasturtium (*Tropaeolum majus*), which contain no tannin, the absorption of oxygen was depressed still more than the production of carbon dioxide. In leaves of other species containing tannin the absorption of oxygen was very rapid for a short time, and though falling quickly, remained at a higher level than the production of carbon dioxide.

Tannin and starch in the assimilating organs of Leguminosae. H. KUNKEI (*Ueber das Vorkommen von Gerbstoff und Stärke in den Assimilationsorganen der Leguminosae. Diss., Göttingen*, 1912, pp. 83; *abs. in Bot. Centralbl.*, 122 (1913), No. 18, pp. 446, 447).—As a result of studies on 208 different species of Leguminosae, the author concludes that tannin is usually more plentiful in leaves or parts more exposed to sunshine, especially in summer, reaching a maximum for the leaves in the vascular bundles and the leaf edges. The stomatal cells vary in this respect less than do neighboring cells. The concentration of tannin is said, however, to be greater in the petiole and shoot than in the leaf. Cells without tannin have more starch than do those containing tannin.

The castor bean plant and laboratory air. E. M. HARVEY (*Bot. Gaz.*, 56 (1913), No. 5, pp. 439-442).—The author reports having found potted seedlings of castor bean, grown under ordinary greenhouse conditions until they had developed from 5 to 7 leaves, were unusually susceptible to gas impurities. One part of ethylene to 50,000 of air was found to result in proliferation and exudation at leaf scars. Leaf fall took place in concentrations as low as 1 part of ethylene to 500,000 of air, or even to 1,000,000 parts of air. A drooping of the youngest well-developed leaves could be taken as an index of the occurrence of still lower concentrations of the gas.

Osmotic pressure in potatoes, M. A. BRANNON (*Bot. Gaz.*, 56 (1913), No. 5, pp. 433-438, figs. 4).—This article has been previously noted (*E. S. R.*, 23, p. 133).

Imbibition studies on seeds of *Avena sativa*, F. PLATE (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat.*, 5. ser., 22 (1913), II, No. 3, pp. 133-140).—Summing up studies carried out with beans in solutions of several acids, bases, and salts, the author claims that no exclusive part in imbibition is played by either cations or anions in this connection, and that most of these chemical agents promote germination even in high concentrations.

Influence of moisture relations on species of *Pinus*, B. HERGT (*Mitt. Thüring. Bot. Ver.*, 39 (1913), pp. 129, 130; *abs. in Bot. Centbl.*, 123 (1913), No. 9, p. 229).—The author notes a striking limitation in growth, during the dry year, 1911, of needles of *P. sylvestris* and *P. nigra* as compared with the 1912 growth on the same branches.

Defoliation: Its effects upon the growth and structure of the wood of *Larix*, A. G. HARPER (*Ann. Bot. [London]*, 27 (1913), No. 108, pp. 621-642, pls. 2, figs. 2).—A study has been made of trunks of larch trees that have been recently defoliated by the larvae of the larch sawfly.

It was found that premature defoliation resulted in a greater or less degree of starvation, which was shown by the quantity of the growth and the structure of the wood formed. If starvation is severe, growth may cease over certain parts of the cambium mantle, while other regions are still active. The investigations showed that in larch trees killed by defoliation, growth ceased entirely at the base of the tree a year or more before the tree died. The first visible effects of defoliation in the structure of the wood is said to be the reduction of the proper thickening of the walls and cells of part or all of the zone of autumn wood, without much decrease in the breadth of the whole ring. The outermost cells of the autumn wood may have their walls unthickened on account of the lack of food supply at this period of the year. Abnormally formed resin ducts were found and they are considered possibly a pathological effect of starvation.

Root secretions of plants, E. A. MITSCHERLICH (*Landw. Vers. Stat.*, 81 (1913), No. 3-6, pp. 469-474).—This continues a somewhat controversial discussion by the author (*E. S. R.*, 28, p. 721), Rodewald (*E. S. R.*, 28, p. 722), and Pfeiffer et al. (*E. S. R.*, 28, p. 518), regarding the existence and expression of a law of minimum.

FIELD CROPS.

[Test work with forage and field crops], M. CALVINO (*Estac. Agr. Cent. [Mexico] Bot.* 66, 1912, pp. 3-23, 41-48, 67-72, pls. 22).—Trials in the production of forage crops are here reported.

Oats and white mustard grown together produced at the rate of 61,000 kg. of green fodder per hectare (28.77 tons per acre) in 3 months, and Thousand-headed kale yielded at the rate of 68,000 kg. in 5 months. *Dactylis glomerata*, *Phleum pratense*, and *Bromus inermis* made satisfactory growth, *Dactylis* being especially luxuriant and reaching 1½ meters at the flowering stage. Notes are given on variety tests of turnips and the value of turnips and oats sown together for forage. Tests of *Trigonella fenum-græcum*, *Medicago arborea*, *Hedysarum coronarium*, and *Onobrychis sativa* are also mentioned.

Variety tests with potatoes produced yields ranging from 2,782 to 13,000 kg. per hectare. Whole tubers gave much better results as seed than cut tubers. Directions for seed selection of potatoes are given. Notes on the value, cultivation, harvest, and uses of buckwheat are given, as are also variety tests in which the yields ranged from 1,800 to 2,800 kg. per hectare.

[Crop experiments for 1912], E. LÓPEZ (*Bol. Ofic. Sec. Agr. Cuba*, 12 (1912), No. 6, pp. 675-681).—This report summarizes the experimental work done during the year with alfalfa, malanga (*Arum*), cassava, plantain, sugar cane, tobacco, peanuts, sweet potatoes, and maize.

[Crop experiments] (*Rev. Indus. y Agr. Tucumán*, 3 (1913), No. 10-11, pp. 477-487).—This paper reports results of variety and cultural tests of maize, rice, cowpeas, beggar weed, peanuts, and cotton.

Cooperative fertilizer and variety tests in Malmohus County, 1912. L. FORSBERG (*Malmö, Läns Hushåll. Sällsk. Kyrktidskr.*, 1912, No. 4, pp. 340-397).—This report covers 83 cooperative fertilizer trials conducted at 50 different farms with barley and oats, mixed cereals, sugar beets, other root crops, potatoes, and meadows. Thirteen lime experiments were also conducted as well as variety tests with winter wheat, barley and oats, potatoes, and root crops.

The results of 4 years' work indicated that 37.5 per cent of the sandy soils experimented with were alkaline, 20 per cent neutral, and 42.5 per cent acid, while the corresponding figures for clay soils were 52.5, 21.5, and 26 per cent.

Report on hemp and tobacco in Italy and Holland. KUIJENBERG ET AL. (*Ber. Landw. Reichsanst. Intern.*, 1913, No. 26, pp. VIII-143, pl. 1, figs. 4).—This publication contains accounts of the cultivation and manufacture of hemp in Italy and of tobacco in Italy, Java, and Sumatra.

Report of the work of the moorland experiment department of the agricultural chemical experiment station at Dublin in 1912. E. ANSON (*Irish. Horkkultur u. Torfverwert.*, 11 (1913), No. 2, pp. 59-68, figs. 4).—In testing the value of moorland for the production of hay, over 20 varieties of cultivated grasses were sown singly and in various mixtures without fertilizers. The yields of the pure cultures ranged from 24.68 to 84 quintals per hectare and the mixtures from 32.5 to 68.85 quintals (from 1.4 to 3 tons per acre).

Potatoes yielded as high as 294.5 quintals per hectare with 400 kg. of 40 per cent potash salt and 100 loads of barnyard manure. The use of 400 kg. each of 40 per cent potash salts and Thomas slag per hectare produced 355.96 quintals of potatoes, as against 242.3 quintals with an application of 200 kg. of flowers of sulphur.

Trials of sugar beets, summer and winter rye, hemp, vetch, scordelia, lupines, summer and winter wheat, barley, flax, sunflowers, and oats are also reported.

Annual report of the Bankipur Agricultural Experimental Station, 1911-12. G. SHERRARD (*Ann. Rpt. Bankipur Agr. Expt. Sta. India*, 1911-12, pp. 121).—This report gives tabulated results of manurial experiments, with cost data, variety tests, and seeding and plowing experiments with rice and sugar cane. The profits were greatest when cow manure and castor cake were used.

Notes on forage in Java and India. C. V. PIERCE (*Philippine Agr. Rev. [English Ed.]*, 5 (1912), No. 8, pp. 428-431, pl. 1).—This paper contains brief notes on *Paspalum conjugatum*, *Panicum numidicum*, *Polypogon monspeliensis*, *Imperata exaltata*, *Paspalum marginatum*, *Andropogon nanulatus*, *Pennisetum cenchroides*, and *Eleusine coracina* as native forage plants in these countries.

Maguay (Cantala) and sisal in the Philippines. M. M. SALLABY (*Philippine Agr. Rev. [English Ed.]*, 6 (1913), No. 4, pp. 183-188, pls. 4).—This article discusses the history, introduction, methods of cultivation, and preparation of the fiber of these two plants in the Philippines.

Tests of raw phosphates. P. E. GALZEW and I. W. JAKUSCHKIN (*Izv. Moskov. Sel'sk. Khoz. Inst. [Ann. Inst. Agron. Moscow]*, 19 (1913), No. 1, pp. 193-204, figs. 2).—These phosphates were derived from different geological formations, viz. golt, turon, and Rjasen, and showed varying values when applied to yellow lupines and buckwheat.

On variation in rust resistance of different forms of pure lines of spring wheat, spring barley, and oats. N. LIŦWINOW (*Trudy BiŦuro Prikl. Bot. (Bul. Angev. Bot.)*, 5 (1912), No. 10, pp. 347-423).—This article gives data in tabular form, obtained from observations during 1910 and 1911, of 186 forms of pure lines of spring wheat, 49 forms of barley, and 50 forms of oats in regard to their behavior toward various rust forms (*Puccinia graminis*, *P. simplex*, *P. coronifer*, and *P. triticea*), including descriptions of leaf surface and dates of sending up shoots of each variety.

The laying down of permanent pastures and meadows. H. LANG (*Landw. Heft*, 1913, No. 12, pp. 32).—This article describes the most important grasses, clovers, and other plants used in pastures and meadows, and gives directions for the selection of soils, varieties, and mixtures for certain purposes. Methods of preparing the seed bed, seeding, cover crops to use, and the care of new meadows and pastures are also discussed.

The care of permanent meadows and pastures. H. LANG (*Landw. Heft*, 1913, No. 13, pp. 32).—This article discusses the artificial and natural methods of regulating the stand of grasses, combating pests, fertilization, irrigation, drainage, and the rejuvenating of permanent meadows and pastures.

The production of grass and hay. C. M. CONNER (*Philippine Agr. Rev. [English Ed.]*, 6 (1913), No. 2, pp. 81-85, pl. 1).—This paper gives descriptions of the production and uses of the native grasses, barit (*Leersia hexandra*), luyaluya (*Panicum repens*), and manimania (*Aplisarpus*).

Propagating abacá (Manila hemp) from seed. M. M. SALEEBY (*Philippine Agr. Rev. [English Ed.]*, 6 (1913), No. 2, pp. 99-101).—Successful trials in propagating *Bagnisanon lauan* and the Pulajan and Tangongon varieties from seed are noted.

The renovation of the abacá (Manila hemp) industry. M. M. SALEEBY (*Philippine Agr. Rev. [English Ed.]*, 6 (1913), No. 4, pp. 167-182, pls. 5).—This article discusses suitable cultural methods, planting, renewal of old plantations, improvement of the quality of the fiber, and adjustment of relations between buyers and producers, with regard to Manila hemp in the Philippine Islands.

Experiments with alfalfa in 1910 at Turkestan Agricultural Experiment Station. P. SNIEDER (*Turkest. Selsh. Khvz.*, 1911, No. 5; abs. in *Zhur. OpŦn. Agron. (Russ. Jour. Expt. Landw.)*, 13 (1912), No. 3, pp. 444, 445).—In studying the influence of slope of the field on the yield of alfalfa it was found that results on a 4 to 5° slope were slightly better than on a 2 to 3° slope. Better yields were produced with barnyard manure than with superphosphate 4 years after application, and in comparing bone meal and ashes the latter was found to have made better yields on a 7-year-old field. In an experiment comparing superphosphate, Thomas slag, bone meal, and barnyard manure, superphosphate gave the best results the second year after application. It was found that alfalfa seed from England, France, Russia, and Germany produced better than native seed.

Barley. H. QUANTE (*Die Gerste*. Berlin, 1913, pp. 135, figs. 35).—This book treats of the morphological, anatomical, and chemical characteristics of barley, its history, development, botanical relations, and varieties; describes brewing valuations, according to the Vienna, Berlin, and Haase systems; and discusses methods of cultivation, harvest, storage, and artificial drying of the grain.

Svalöf golden barley. H. TRÖN (Sveriges Utsädesför. Tidskr., 23 (1913), No. 1, pp. 27-50, pl. 1).—This article discusses the origin of this new variety of barley, the chief characteristics of which are its heavy yield of grain, resistance to smut (*Ustilago carbo*), and quick curing of the grain after harvest.

Cultural experiments at Stettin. K. STRÖMER (*Deut. Landw. Presse*, 40 (1913), Nos. 5, pp. 47, 48; 6, pp. 53, 59).—These articles report the results of

growing several varieties of barley on clay and sandy soils. The yields ranged from 811 to 2,150 lbs. of grain per morgen (1,285 to 3,410 lbs. per acre); 1,000 kernels weighed from 34.88 to 48.05 gm., and a hectoliter weighed from 63.9 to 69.65 kg.

New directions in the work of the selection of maize. I. ROSIN (Khozgostek, 1912, No. 31, pp. 1015-1020; *abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 10, pp. 2156-2159).—This article discusses a system of producing and using the first hybrid generation to secure increased yields with maize, the objects of this system being to prevent self-fertilization and to keep the 2 parent strains pure. It is stated that the 2 strains may be kept pure by planting in alternate rows. The rows of 1 strain are topped the same year and from these the hybrid seed is obtained, while the plants of the other row supply the caryopses (for 2 years) required for the preservation and propagation of that strain; in the subsequent year the opposite plan is followed.

The following observations are noted: "The descendants of a self-fertilized plant are always less developed and productive than the descendants of plants naturally exposed in the fields to cross-fertilization; this is true both of superior individuals and individuals inferior in point of productivity to the average of the type to which they belong. The greatest diminution in the growth and yield in consequence of self-fertilization is found in the first generation, falling off gradually in the subsequent generations down to a constant value. The pure strains (or self-fertilized, coming from a single parent plant) are distinguished, among themselves, by transmissible morphological characters. The retrogression of the fluctuating characters is observed with greater frequency in proportion as we get farther away from the 'mean morphological type' characteristic of a 'pure strain.' The crossing between 'brothers' and 'sisters' (between male and female inflorescences, respectively, of 2 plants coming from a single parent plant and belonging to the same generation) presents no advantage over self-fertilization. Crossing between 2 self-fertilized strains of different types yields a progeny which is not inferior in force of growth and productivity to the plants never subjected to self-fertilization.

"In crossing 2 self-fertilized strains the results from the reciprocal crosses are identical. The seeds of F_1 obtained by crossing pure strains according to a determined scheme (combination) always exceed in yield the sowing material produced by irregular pollination in the fields, from which the 2 strains themselves were derived. The productivity and morphological characteristics of the hybrids of the first generation are therefore a function of that specified combination of pure strains, and are constantly repeated when the crossing is renewed. In the first generation of hybrids (F_1) the degree of variability of the individuals is not greater than that observed in the pure strains from which such generation sprang. In the second generation of hybrids (F_2) the degree of variability is higher than in F_1 . The productivity of F_2 is lower than that of F_1 ."

Variety tests of imported maize. A. H. ROSENFELD (*Rev. Indus. y Agr. Tucumán*, 3 (1912), No. 2, pp. 51-53).—Results are given of tests conducted with 16 varieties of maize. In general the yields were much better in 1912, ranging from 387 to 3,535 kg. than in 1911, when they ranged from 234 to 2,675 kg. of grain per hectare.

A new variety of maize. C. M. CONNER (*Philippine Agr. Rev. [English Ed.]*, 6 (1913), No. 2, p. 96).—This new variety is a cross between the Mexican June and a native white variety, and is named Moro. Preliminary tests have shown it to yield better than the small native varieties and to make good meal and

hominy. The ears average 19 cm. (7.4 in.) long and 5 cm. thick at the center and have 16 rows of grain.

Distance to plant maize, A. H. ROSENFELD (*Rev. Indus. y Agr. Tucumán*, 3 (1912), No. 6, pp. 231-235).—In this experiment plants spaced 125 cm. (about 40 in.) in rows 30 and 75 cm. apart gave better results than plants spaced 40, 75, or 100 cm. in rows spaced 30, 75, and 100 cm. apart. The check-row system, with hills of 3 or 4 plants about 1 meter apart, yielded about 30 per cent better than the row system.

Fertilizing maize (*Prog. Agr. y Pecuaria*, 19 (1913), No. 818, pp. 258-260).—Results of the use of commercial fertilizers for corn in 3 different fields are given, in which increased yields were obtained at a profit by the use of the fertilizer.

The effect of water level on the yield of cotton (*Agr. Jour. Egypt*, 2 (1912), No. 1, pp. 37, 38, fig. 1).—The results of an experiment, in which the water level ranged from 0.8 to 2.2 meters (from 31 to 86 in.) below the ground surface, showed increased yields as the depth of water level increased.

A report on the production of new cottons, W. L. BALLS (*Agr. Jour. Egypt*, 2 (1912), No. 2, pp. 66-77, pls. 4).—This article gives the methods employed in crossing and the preventing of crossing, and discusses the time required for propagation, simple propagation of seed, a list of approximate constants, and possible rates of propagation. In some of the new cottons produced the mean maximum lint strength ranged from 27.7 to 33.5 mm.

Experiments in cotton cultivation at the experiment station of Karalasi, Transcaucasia, V. DMITRIYEVSKI (*Abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 11, pp. 2425, 2426).—This experiment was based upon the color of the cotton seeds, and as a rule the green seeds gave a more abundant and finer fiber than those of other colors. The results of planting seeds picked at different dates showed very little difference in yield or date of maturity, although the slight difference was in favor of the later picking.

Annual report of the government cotton station at Myombo (*Pflanzer*, 8 (1912), No. 6, pp. 323-331).—In a test of 6 varieties the yields of ginned cotton ranged from 52.6 to 213.2 kg. per hectare (46.3 to 189.7 lbs. per acre). Seed planted January 22 produced 196.4 kg.; that on February 3, 92.4 kg.; that on February 20, 34.8 kg.; and that on March 4, 10 kg. ginned cotton per hectare. When plants were thinned to 2 in a hill placed 100 by 80 cm. apart, the yields of ginned cotton were, on 2 plats, 129.2 and 138.4 kg. per hectare, respectively, and when thinned to only 1 plant per hill on 2 plats 53.5 and 42 kg. per hectare, respectively. Irrigation did not increase the yields.

Cowpeas, R. B. BLOVIN (*Rev. Indus. y Agr. Tucumán*, 3 (1913), No. 8, pp. 355-359).—Numerous varieties are described and methods of production, alone and in combination with maize and with cane, are discussed.

Don experiment field, I. KOLESNIKOV (*Abs. in Zhur. Opytn. Agron. [Russ. Jour. Expt. Landc.]*, 13 (1912), No. 3, pp. 448, 449).—The apparent increase in the yield of flaxseed for 9 years due to deeper plowing amounted to 14 per cent.

Fertilizers in the production of hemp, PALLADIUS (*Prog. Agr. y Pecuaria*, 18 (1912), No. 770, pp. 261-264, figs. 4).—In these experiments it was found that the addition of potash to other fertilizers apparently increased the yield of fiber, in some cases more than 100 per cent. The yields ranged from 1.550 to 2.530 kg. per hectare (1.646 to 2.251 lbs. per acre).

Studies on hemp culture in Italy, W. F. BAUCK (*Tropenpflanzer*, 15 (1911), Nos. 3, pp. 129-141; 4, pp. 187-202; 5, pp. 244-264, figs. 6).—This article discusses the importance of the hemp industry in Italy, gives a brief historical review, including the development of hemp culture in different parts of the

country, and describes at greater length the Italian culture of the crop. The relation of hemp culture to farm management, farm labor, and export trade is also dwelt upon, and types of machines used in the different processes of preparing the fiber for market and for use are described.

New cover crop, F. G. SPAINO (*Agr. Bul. Fed. Malay States, I* (1912), No. 1, pp. 13, 14).—This describes the horse gram (*Dolichos biflorus*), gives directions for its cultivation, and discusses its value as a cover crop for rubber plantations. Its chief value for this purpose lay in choking out weeds.

The Italian millet (*Setaria italica*) in Bengal, E. J. WOODHOUSE and A. C. GHOSH (*Dept. Agr. Bengal, Quart. Jour.*, 5 (1912), No. 4, pp. 180-186). Detailed descriptions of several varieties of this millet are given, also the results of head selection during one season's work. It is noted that this crop seems well suited to Bengal conditions, producing yields when maize fails.

Philippine kapok: A promising new industry, M. M. SARTREY (*Philippine Agr. Rev. [English Ed.]*, 5 (1912), No. 8, pp. 432-437). This paper gives brief notes on the export trade of kapok in Java, the Philippines, and Dutch East India, and on the yield, value, and uses of the crop and its prospective cultivation in the Philippines.

Potato breeding, C. FREWIRTH (*Deut. Landw. Presse*, 59 (1912), Nos. 47, pp. 551, 552; 48, pp. 565-567, figs. 4).—The author here relates his experience in hybridizing potatoes. Hand fertilization of the flowers proved unsuccessful. From a study of the plants produced from seed which was obtained from the balls produced by accidental crossing, or self-fertilization, it is noted that the offspring seldom, if ever, resembled the mother plant; that the long form was dominant over round; and that the red skin color of the tuber, the blue color of the flower, and the yellow color of the tuber flesh were respectively dominant over white.

Notes on the propagation of Rhodes grass for hay, H. F. HENDERSON (*Philippine Agr. Rev. [English Ed.]*, 5 (1912), No. 8, pp. 438-444, fig. 1). This paper suggests methods of propagation, irrigation, harvesting, and baling of Rhodes grass (*Chloris gayana*) for trial in the Philippines in the production of this grass for hay.

Selection of seed rice based on transparency, C. CERVASI (*Ital. Fecon. Indochine, n. ser.*, 15 (1912), No. 96, pp. 388-392, figs. 2). This article describes the method employed in seed selection of rice by passing before the rays of a lamp. Numerous varieties were thus selected and a maximum of 47 per cent, a minimum of 11.4 per cent, and an average of 22.3 per cent of inferior kernels were detected. Certain samples weighed 570 gm. per liter before selection and 620 gm. afterwards.

A description of the apparatus employed in this selection is given.

Data concerning varieties of rice, C. M. CONNER (*Philippine Agr. Rev. [English Ed.]*, 6 (1913), No. 2, pp. 86-92, figs. 4). This paper records a continuation of work already mentioned (E. S. R., 28, p. 525), in which 279 varieties of white lowland rice grown in Indo-China were compared with a like number of lowland varieties grown in the Philippine Islands.

The greatest number of varieties matured within 6 months from sowing and the time to maturity had no relation to yield. It was found that the number of grains per head was in inverse ratio to the size of the grain, and that the size of the grain had little influence on yield. A distinguishing characteristic of the upland rice was that its average length and width of leaf was 41 and 20 per cent, respectively, greater than that of the lowland varieties.

Salt water rice, C. M. CONNER (*Philippine Agr. Rev. [English Ed.]*, 6 (1913), No. 2, p. 97).—Tests showed that a variety of rice found growing in sea water produced as well when irrigated with this water as it did with fresh water.

Samar (*Cyperus alopecuroides*) as a reclamation crop, J. D. SHEPHERD (*Agr. Jour. Egypt*, 2 (1912), No. 2, pp. 78-80, pl. 1).—A method of growing this crop (which is used to make mats, etc.) on land too wet for rice is described.

Magnesia fertilizer for sugar beets, F. STROHMER and O. FALLADA (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw.*, 42 (1913), No. 2, pp. 221-231).—The results of fertilizing 3 plots with magnesium sulphate showed no variation in total yield, sugar content, or chlorophyll content of the beet leaves, over 3 untreated plots that could be attributed to the magnesium salt, which was applied at the rate of 150 kg. per hectare (133.5 lbs. per acre). A bibliography is appended.

Conditions of seed ball produced by stock beets of different sizes, T. Remy (*Zent. Ver. Rübenz. Indus. [Vienna]*, 51 (1913), No. 7, pp. 116, 117).—This article gives the results of experiments in producing seed from whole beets and divided beets (cuttings). It is noted that cuttings of from 100 to 150 gm. in weight, standing 70 by 80 cm. apart, produced as much seed as 10 times the same weight of whole beets standing 1 meter each way. The seeds from the cuttings seemed to have the same productive power as those from the whole beets.

The influence of light on sugar formation of beets, F. STROHMER (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw.*, 42 (1913), No. 2, pp. 232-235; *Wehnschr. Zent. Ver. Rübenz. Indus. [Vienna]*, 51 (1913), No. 7, pp. 116, 117).—This article discusses further work (E. S. R., 28, p. 825) on the influence of light and shade on sugar-beet development in general, and gives results of the author's investigations. In these the percentage of sugar did not seem to change, but the total yield was considerably greater in direct sunlight than in shadow, ranging from 80.1 to 72.1 gm. per beet in the former and from 34.1 to 25.6 gm. in the latter case with 2 varieties.

Variety tests of sugar cane, A. H. ROSENFELD and J. A. HALL (*Rec. Indus. y Agr. Tucumán*, 3 (1913), No. 8, pp. 325-334).—This article gives the results of tests of over 70 varieties of cane in 1910-1912, in which the yields ranged from 88 to 6,774 kg. of sugar per hectare (78 to 6,029 lbs. per acre).

Tests in selection of sugar cane before planting, A. H. ROSENFELD (*Rec. Indus. y Agr. Tucumán*, 3 (1912), No. 1, pp. 1-5).—The methods of selection and cultivation are described. Germination in the field showed a ratio of the selected cane to the unselected of 153:44. The selected seed yielded 62,964 kg. of cane, which produced 3,425 kg. sugar per hectare, as compared with 51,216 kg. cane yielding 1,975 kg. of sugar per hectare. It is also noted that only about 37 per cent of the crop from the selected seed was injured by worms, as compared with 60 per cent of the unselected crop.

Sugar-cane experiments in Antigua and St. Kitts, 1910-11, H. A. TOMPSON (*Jour. Bd. Agr. Brit. Guiana*, 6 (1912), No. 2, pp. 58-60).—Results of variety and manurial tests are given. Nitrate of soda and sulphate of ammonia at the rate of 40 and 60 lbs. per acre in a single application apparently increased the yields, while phosphoric acid and potash gave no increase.

The crops on the experimental sugar-cane fields, 1911, J. B. HARRISON and F. R. STOCKDALE (*Jour. Bd. Agr. Brit. Guiana*, 5 (1912), No. 4, pp. 212-230).—In variety tests the yields ranged from 1.48 to 3.37 tons sugar per acre. In fertilizer tests better results followed the application of about 300 lbs. per acre of sulphate of ammonia than that of other fertilizers.

Experiments in the cultivation of sugar cane in 1912 and 1913, R. E. BLOVIN (*Rec. Indus. y Agr. Tucumán*, 3 (1913), No. 10-11, pp. 418-477).—This article gives notes and data on varieties tested, methods of cultivation, the use of fertilizer plus lime, selection, rotations, and distance in planting.

A new earth nut, O. W. BABBETT (*Philippine Agr. Rev.* [English Ed.], 6 (1913), No. 2, pp. 104, 105).—It is noted that this new nut has been discovered in West Africa and is known as *Voandzeia poissoni*, or *Kerstingella goeacarpa*.

Xenia in wheat, L. BLARINGHEM (*Compt. Rend. Acad. Sci. [Paris]*, 156 (1913), No. 10, pp. 802-804, fig. 1).—The author describes a hybrid that he produced and which, it is claimed, showed the influence of the pollen in the size and shape of the caryopsis and in the morphological characters of the albumin. Tabulated measurements of kernels are given.

Notes on wheat, J. CASCÓN (*Bol. Agr. Tec. y Econ.*, 2 (1919), No. 2, pp. 353-382; 3 (1911), Nos. 25, pp. 86-91; 33, pp. 1041-1048; 4 (1912), No. 4, pp. 1035-1047, pls. 3).—These reports give the results of variety tests and other data on the measurements of wheat, barley, and oats grown in 1910-1912 in Spain. Improvements in yields and conditions in general are noted from year to year, especially with foreign introductions.

In 8 varieties of wheat grown in 1912 the average length of heads ranged from 9.4 to 16.3 cm. The weight of 10 heads ranged from 15.6 to 28.5 gm., the average weight of individual heads from 1.56 to 2.85 gm.; the weight of grain from 10 heads of each variety, from 11.7 to 20.6 gm.; the number of kernels per head, from 29.5 to 49.4 gm., and the weight of 1,000 kernels, from 363 to 539.5 gm. The volume of 1,000 kernels ranged from 28.8 to 41.5 cc.; the volume of 1 liter, 525.4 to 681.7 cc.; the specific gravity from 1.25 to 1.62, and the number of kernels per liter from 16,137 to 22,746. The number of kernels per kilogram ranged from 18,533 to 27,548, and the weight of 1 liter of kernels from 821.6 to 880.2 gm. The yields of wheat per hectare ranged from 2,296 to 3,351 kg., and barley from 3,987 to 4,100 kg. Oats yielded 2,115 kg.

Results of fertilizer experiments with wheat, barley, and oats, and the analyses of wheat flours for 1912 are given in tabular form.

Observations on stooling in cereals at the Poltava Experiment Station, P. LESHCHENKO (*Khutorânin*, 1911, No. 39; abs. in *Zhur. Oppts. Agr. [Russ. Jour. Expt. Landc.]*, 13 (1912), No. 3, pp. 478, 479). Eight plants of winter wheat and 10 of spring wheat were selected and placed under observation, the time of appearance of the heads of each stem being noted in order to determine the relation to yield.

From the collected data it appears that the later the heads formed and developed the less was the yield. Determinations were made of the length and weight of each head and of the weight and number of kernels of each head. The author further observed that plants in cases of intense stooling lost enormous quantities of energy in producing barren stalks. None of the plants with an average of 20 stalks had more than 12 stalks which produced heads.

Determination of the germinative ability and germinative strength of seeds, W. OETKEN (*Deut. Landw. Presse*, 49 (1914), Nos. 24, pp. 287, 288; 25, p. 395; 27, pp. 329, 330; 28, p. 337, figs. 2).—The author first sets forth the difficulty of getting results with exactness, because of the "artificial" seed beds and other "artificial" conditions commonly used in the laboratory. It is noted that, to secure the desired results with seed germination, tests must be conducted with the 4 following points in view: To secure natural temperature conditions in order to promote rapid germination; to secure uniform resistance to vegetative energy; to cover a definite period of growth so as to determine the rate of development of the seedlings by weight of dry matter produced; and to determine the degree of health of the seedling as soon as it appears.

In a test with peas to determine the efficiency of sand and soil as germinating mediums, the percentage of germination in the sand ranged from 85 to 100 per cent, in the soil from 24 to 86 per cent, and in the field from 15 to 68 per cent. In testing the advisability of taking the weights of the seedlings at the end of a definite period in order to determine the relative vegetative energy, it was found that samples of winter wheat showing 90, 71.25, 21, 38, 60, 48.25, and 46 per cent weighed, respectively, at the end of 10 days, 5.30, 3.70, 28, 1.65, 68, 2.27, and 57 gm. With spring wheat the variation between germinative ability and weight of seedling was even greater.

Report of the superintendent of the seed and weed branch, A. MCKENNEY (*Ann. Rpt. Dept. Agr. Alberta, 1911, pp. 133-140*).—The methods described as being the most successful in the eradication of stinkweed are summer fallow and spring harrowing. For wild mustard, spraying with a 20 per cent solution of iron sulphate or a 2 per cent solution of copper sulphate is recommended, and for Canada thistle, continued cutting off at or below the surface of the ground.

Tabulated data of results of inspection of cars of seed supplied the farmers by the Dominion government are included.

Agrostemma githago and *Polygonum convolvulus*, N. SKALOSUBOW (*Trudy Biuro Prikl. Bot. (Bull. Agric. Bot.)*, 4 (1911), No. 11, pp. 562-565).—This article discusses the prevalence of these weeds in western Siberia and the value of the seeds and meal as feed for live stock.

HORTICULTURE.

The propagation and pruning of hardy trees, shrubs, miscellaneous plants, with chapters on manuring and planting, J. C. NEWSHAM (*London, 1913, pp. XIV+224, pls. 57*).—A practical treatise on plant propagation and pruning, in which consideration is given to fruit trees, ornamental deciduous trees and shrubs, and evergreen trees and shrubs, as well as to stove and greenhouse foliage and flowering trees and shrubs.

Practical tree repair, E. PELTS (*New York, 1913, pp. IV+265, pls. 18, figs. 62*).—A practical treatise on the physical repair of trees, such as bracing and the treatment of wounds and cavities. Chapters on boring insects and their control and for fungi and their work are included.

The use of arsenicals for plant protection, with special reference to lead arsenate, L. FULMPEK (*Arch. Chem. u. Mikros.*, 6 (1913), No. 6, pp. 347-408).—A review of our knowledge relative to the use of arsenicals in various countries for the protection of plants. An extensive bibliography is appended.

The effect of bastard trenching on the soil and on plant growth, S. F. PICKERING and E. J. RUSSELL (*Jour. Agr. Sci. [England]*, 5 (1913), No. 4, pp. 483-496).—The purpose of the experiments here reported was to determine the value of subsoiling without the addition of farmyard manure or other fertilizing material. The bulk of the experiments extended over the four seasons from March, 1909, to the end of 1912. Four distinct types of soil, including a light sand, two rather heavy loams, and a strong clay, were investigated. Trenching was effected by removing the first and second spades of soil. The third spade was broken up but not removed, and then the second and first spades were replaced in their natural order. Nothing was buried in the trench. Samples of soil were periodically taken for determinations of moisture and nitrates and observations were made on the growth of fruit trees on the plots.

Taking the evidence as a whole the effect of bastard trenching on the soil when unaccompanied by manuring is very small. Beyond a tendency to facilitate the drainage of water in the clays and the heavy loams and slightly to increase the nitrates no definite change seemed to be produced. As exemplified

by these experiments and by results obtained in some earlier experiments on the same plot of ground the effect on the growth of trees appears to depend largely on the character of the seasons following the trenching and planting. Generally speaking the author concludes that in the absence of a hardpan the main use of trenching seems to be that it affords an opportunity for adding manure or other fertilizer material to the soil.

An economic study of beans. E. M. LEDYARD (*Philippine Agr. and Forester*, 2 (1912), No. 4-6, pp. 66-85).—An economic and cultural test of a number of different species of beans is reported. The author concludes that on account of its wide adaptation as regards soil and its value as a garden and field bean, and also as a soil improver the cowpea is well adapted for general introduction into the Philippine Islands. The cowpea resembles the Philippine *sirao* which is a favorite bean for culinary use in the islands.

Supplementary studies on the differential mortality with respect to seed weight in the germination of garden beans. J. A. HARRIS (*Univ. Cal.,* 37 (1913), Nos. 563, pp. 683-700; 564, pp. 739-759, figs. 51). In an earlier study of field cultures of *Phaseolus vulgaris* the author found that both large and small seed are less capable of developing into fertile plants than are those which do not deviate so widely either above or below the type (E. S. R., 28, p. 636). In order to substantiate these results greenhouse plantings in sand of some 48,000 individually weighed seeds, chiefly of the pedigrees employed in the field experiments, were made. The present paper discusses the results of this second study with special reference to the questions of the existence of a differential mortality and of its consequences in the population.

In general the results of the first study are fully confirmed. As a result of the more extended data secured from these greenhouse cultures, the author is led to conclude that there is strong evidence for varietal differences with respect to mortality. In some strains the heavier, in others the lighter, seeds seem less capable of development. From the data at hand no definite conclusion is drawn relative to the cause of this variation, but it is suggested that the reason for these differences may be sought in the inherent characters of the stocks used or the environment to which they have been subjected.

The author's studies are to be continued for the purpose of determining the causes of the observed differences in viability.

The pollination of fruit trees and its bearing on planting. C. H. BOGGER (*Gard. Chron.*, 3. ser., 54 (1913), Nos. 1496, pp. 493, 494; 1497, p. 499). A review of recent European investigations on this subject, all of which tend to show that cross-pollination is the rule and that this is effected more by insects than by the wind. Honeybees and bumblebees are the best pollinizers. See also a previous note (E. S. R., 28, p. 237).

On the pruning and spacing of grapevines. J. L. VIDAL (*Rev. Vit.*, 39 (1913), Nos. 1013, pp. 689-693; 1014, pp. 713-729; 1015, pp. 752-756; 1017, pp. 814-819; *Bul. Agr. Algérie et Tunisie*, 19 (1913), Nos. 15, pp. 305-319; 16 pp. 321-331).—The author here reports a comparative test of various systems of pruning and spacing grapes as conducted with vines grafted to 21 different stocks. Information is also given relative to the value of these stocks for a limey soil.

On the behavior of various grape stocks on heavy calcareous soil. H. FAYS (*Prog. Agr. et Vit. (Ed. l'Est-Centre)*, 34 (1913), No. 59, pp. 743-746).—Summarized data are given showing the annual condition of Chasselas grapes grafted on various American and French-American grape stocks and set out on a heavy limey soil in 1909. Generally speaking the French-American stocks have been somewhat superior to the pure American stocks in their resistance to adverse soil conditions.

The hybrid direct bearers in the valley of the Rhone in 1912, A. DESMOULINS and V. VILLARD (*Prog. Agr. et Vit. (Ed. l'Est-Centre)*, 34 (1913), No. 46, pp. 433-436).—In continuation of previous observations relative to hybrid direct bearing grapes (E. S. R., 27, p. 540) the results for the first season are given of observations which deal with the time at which the different varieties start growth in the spring. These observations are to be continued for a number of years.

Date growing in the Old World and the New, P. B. POPENOE (*Altadena, Cal.*, 1913, pp. XVIII+316, pls. 49).—In part 1 of this work the author gives a detailed account of commercial date growing in the Old World and in the United States, including methods of propagation, cultural operations, handling the crop, artificial ripening, diseases and pests, the classification of dates, profit of date growing, and uses of the date, with a chapter on its food value by C. L. Bennett. Part 2 contains a descriptive list of the important varieties which are now being grown in the United States. *

Tea, ERNST A. BROWNE (*London*, 1912, pp. VIII+88, pls. 23).—A descriptive account of the tea industry in various countries.

Fertilizers and the freezing of nut trees (*Rev. Sci. [Paris]*, 51 (1913), II, No. 26, p. 813).—Brief reference is made to experiments in which the winter application of mineral fertilizers not only increased the vigor and yield of almond trees but apparently increased their resistance to cold to a marked extent.

Indoor gardening in room and greenhouse, H. H. THOMAS (*London, New York, Toronto, and Melbourne*, 1912, pp. 152, figs. 149).—A popular treatise on the culture of house and greenhouse ornamentals with a working calendar for the year. A chapter on the forcing of grapes is also included.

The hardy flower book, E. H. JENKINS, edited by F. W. HARVEY (*London and New York*, 1913, pp. XIV+143, pl. 1, figs. 59).—This work is offered as a complete guide to the methods of planting and cultivating hardy flowers. Part 1 deals with the principal uses of hardy flowers and discusses in detail some of the more important families as well as the proper grouping of plants for borders. Part 2 consists of an alphabetical list of all hardy herbaceous flowers considered worth growing, together with concise directions for their treatment. Part 3 consists of tabulated lists of hardy plants for all purposes.

The florist's bibliography: Supplement and index, C. H. PAYNE (*London*, 1912, pp. 79-199+VIII).—This publication, which supplements a handbook issued in 1908 (E. S. R., 21, p. 46) contains a list of recent references to books and treatises devoted primarily to florist's flowers and the flower garden.

FORESTRY.

Annual report on the progress, literature, and important happenings in the realms of forestry, hunting, and fishing for the year 1912, H. WEBER (*Allg. Forst u. Jagd Ztg.*, 1913, Sup., pp. VIII+199).—As in previous years (E. S. R., 27, p. 815), this supplement contains abstracts of the more important literature of the various phases of forestry, together with notes on the principal occurrences relating to forestry, hunting, and fishing during 1912. As in the last supplement, the international scope of the literature reviewed has been strengthened.

The present situation of forestry, H. S. GRAVES (*Proc. Nat. Conserv. Cong.*, 4 (1912), pp. 318-327).—An address on this subject delivered before the Fourth National Conservation Congress, Indianapolis, October, 1912, in which the author reviews the progress of federal and state forestry in the United States.

Forest map of Brazil, G. DE CAMPOS (*Relat. Min. Agr. Indus. e Com. Brazil*, 1911, No. 3, pp. 1-68, pl. 1).—This comprises a map including descriptive text of the forest areas in Brazil, which has been prepared in connection with a proposed establishment of forest reserves in that country.

Reconnaissance in the Cotteswolds and the Forest of Dean. A. G. TANSLEY and R. S. ADAMSON (*Jour. Ecology*, 1 (1913), No. 2, pp. 81-89). The results are given of a reconnaissance survey in the above-named forests with special reference to tree association and ground vegetation.

The forests and forestry of Germany. W. R. LAZENBY (*Pop. Sci. Mo.*, 88 (1913), No. 6, pp. 590-598, figs. 5).—A popular descriptive account.

Botanical and colonial economic studies of the bamboos. C. C. HOSSTERS (*Bot. Centbl., Beihefte*, 31 (1913), 2. Abt., No. 1, pp. 1-69, figs. 12).—This paper, which consists largely of a compilation of information relative to the economic uses of the bamboo, was prepared with special reference to the extension of bamboo-culture in the German colonies.

The culture of *Manihot glaziovii* in East Africa. P. JANSSENS (*Bul. Agr. Congo Belge*, 4 (1913), No. 3, pp. 670-689, pl. 1, figs. 13). A report on the development of the plantatio rubber industry in East Africa with special reference to *Manihot* rubber. Information is given relative to general cultural practices, tapping operations, rubber coagulation, and preparation for market.

On the economic value of sal (*Shorea robusta*). R. S. PRINSON (*Indian Forest Mem., Econ. Ser.*, 2 (1913), No. 2, pp. VI+76, pls. 81). This work deals with the economic uses of the sal tree. The subject matter is discussed under the following general headings: The physical and mechanical properties of sal timber; the durability of sal timber; uses of sal timber and minor products obtained from the tree; sal fuel; and outturn and prices of sal timber.

The wild plants of the South Kamerun forests used by the natives. J. MILDBRAED (*Notizbl. K. Bot. Gart. u. Mus. Berlin*, 1913, App. 27, pp. 43). This comprises a descriptive account of a large number of plants which are utilized by the Bulus in South Kamerun for various purposes.

The present status of the forest seed origin question. A. ENGBER (*Naturw. Ztschr. Forst u. Landw.*, 11 (1913), Nos. 19, pp. 341-363; 21, pp. 381-391). A popular review of the author's long-continued investigations, previously noted (E. S. R., 29, p. 841).

Coast sand dunes, sand spits, and sand wastes. G. O. CASE (*Geograph.*, 44 (1913), Nos. 1129, pp. 352-358; 1130, pp. 388-393; 1131, pp. 424-427; 1132, pp. 469-463; 1133, pp. 496-499; 1134, pp. 536-538; 1135, pp. 576-589; 1136, pp. 616-620; 1137, pp. 660-662; 1138, pp. 696-699, figs. 17). This comprises a résumé of the work accomplished and the methods employed in various countries in the fixation of sand dunes and the reclamation of sand wastes, including many references to the literature on the subject.

Forest fires in North Carolina during 1912 and national and association cooperative fire control. J. S. HOLMES (*N. C. Geol. and Econ. Survey, Econ. Paper 33*, 1913, pp. 58, fig. 1).—In this paper the author gives a record of forest fires in North Carolina during 1912 with comparative data for previous years, together with a general account of the progress made in the control of forest fires by the federal and state agencies and by private associations.

In North Carolina the State has no organized fire protective system. The total loss from forest fires during the past 4 years is estimated at over \$2,500,000.

Practical experiences in the use of fluorids for wood preservation. R. NOWOTNY (*Ztschr. Angew. Chem.*, 26 (1913), No. 36, Aufsatzteil, pp. 694-709).

The author here presents data showing the results secured in different parts of Austria in the use of various fluorid compounds for preserving telegraph poles, etc. Summarizing the results as a whole the zinc fluorid and sodium fluorid compounds have proved to be strongly antiseptic against wood-destroying fungi and much superior to copper sulphate and zinc chloride.

A number of references to the literature on the use of fluorid for preservative purposes are cited.

DISEASES OF PLANTS.

The fungus diseases of agricultural plants, J. ERIKSSON, trans. by A. Y. GREVILLIUS (*Die Pilzkrankheiten der landwirtschaftlichen Kulturpflanzen*, Leipzig, 1913, pp. XVI+246, pls. 3, figs. 130).—This is a German edition of a book previously noted (E. S. R., 23, p. 345).

Annual report on plant diseases, 1911, M. HOLLEUNG (*Jahresber. Pflanzenkrank.*, 14 (1911), pp. VIII+410).—This report, published in 1913, continues the general plan of its predecessors (E. S. R., 23, p. 345), the literature cited for 1911 including 2,300 titles.

A preliminary host index of the fungi of Michigan, exclusive of the Basidiomycetes, and of the plant diseases of bacterial and physiological origin, G. H. COONS (*Rpt. Mich. Acad. Sci.*, 14 (1912), pp. 232-276).—Lists are given of parasitic fungi observed as occurring on various host plants in Michigan.

Report on the work of the phytopathologist at Wageningen for 1911, J. RITZEMA BOS (*Meded. Rijks Hoogere Land, Tuin en Boschbouwsch. [Wageningen]*, 6 (1913), No. 3, pp. 165-163).—This is an account of observations and experiments reported in relation to plant disorders due to inorganic agencies attacks by plant or animal enemies, or undetermined causes.

Report of the botanical laboratory and laboratory for plant diseases, L. LINSBAUER, F. ZWEIFELT, and H. ZUDERELL (*Programm u. Jahresber. K. K. Höh. Lehranst. Wein u. Obstbau Klosterneuburg*, 1912-13, pp. 159-173, figs. 3).—A report is given on various investigations on plant diseases and insect pests, together with means adopted for their control. The principal investigations were carried on with those pests attacking orchard fruits, grapes, berries, potatoes, vegetables, and ornamentals.

Plant diseases observed in 1912 at the agricultural academy at Kolozsvár, B. GEÖF (*Kísérlet. Közlem.*, 16 (1913), No. 2, pp. 271-277, pl. 1).—*Phoma faniculina* is reported from the same locality as in the previous year. *Puccinia malvacearum* is said to infest not only *Althaea rosea nigra*, but also seriously *A. officinalis* in the neighborhood and sporadically *Malva sylvestris* and *M. vulgaris rotundifolia*, which are suspected to constitute a medium for the probable adaptation of this fungus for living on *A. officinalis*. *Plasmopara nivea* was noted on leaves of *Conium maculatum* lying through the winter, appearing about May 15 and showing oospores about August 15. *Puccinia bullata* appeared about the same time on leaves, petioles, and twigs of the same host, showing its fruiting bodies about the same time and evidently inflicting considerable injury.

Agricultural botanical notes from the experimental plats at Ultuna, 1912, E. HENNING (*Sveriges Utsädesför. Tidskr.*, 23 (1913), No. 2, pp. 129-141, fig. 1).—Discussions are given of the development of the winter wheat plants in the late fall of 1911, the size of leaves of the wheat varieties at time of blooming, mealy and glassy winter wheat kernels, the appearance of yellow and black rust (*Puccinia glumarum* and *P. graminis*) on small grains, and infection experiments with loose smut of barley (*Ustilago nuda*).

A contribution to the mycological flora of Russia, N. NAUMOFF (*Bul. Trimest. Soc. Mycol. France*, 29 (1913), No. 2, pp. 273-278, pl. 1; abs. in *Internat. Inst. Agr. [Rome]*, Mo. *Bul. Agr. Intel. and Plant Diseases*, 4 (1913), No. 7, p. 1115).—Preliminary to publication of a fuller list of collections in Russia, the author notes three species of fungi obtained in the summer of 1912, which are described under the respective names of *Bremia graminicola* n. sp. (on leaves of *Arthrazonis ciliaris*), *Cicinobolus bremiphagus* n. sp. (pycnidia of which were attached to fruiting organs of *B. graminicola*), and *Rhodoseptoria ussuriensis* n. g. and sp., destroying leaves and fruit of the Manchurian plum.

Amygdalase and amygdalinase in *Aspergillus niger* and related Hyphomycetes. M. JAVILLIES and MME. H. TCHERNOUZIKY (Ann. Inst. Pasteur, 27 (1913), No. 6, pp. 440-449).—The authors state, as the result of a study of *A. (Sterigmatocystis) niger* and some related fungi, that most of these are unequally rich in the two diastases, amygdalase and amygdalinase, a low percentage of zinc in the culture medium corresponding to a deficiency of both; also that in most of the fungi studied, the first named enzyme predominates, the proportions varying somewhat with the age of a given culture.

Morphological alterations in *Aspergillus niger* grown in various acids and acid salts. A. KIESEL (Ann. Inst. Pasteur, 27 (1913), No. 6, pp. 481-488, pls. 2).—Pursuant to previous reports (E. S. R., 20, p. 731), the author figures and describes numerous alterations in mycelial growth and in cellular size, form, vacuolation, granulation, etc., noted in case of *A. niger*, grown in various media.

Some factors which influence the development of *Penicillium glaucum*. H. I. WATERMAN (Over eenige factoren, die de ontwikkeling van *Penicillium glaucum* beïnvloeden. Proefschr. Tech. Hogesch. Delft, 1913, pp. 157). Summarizing the results of an extended study of factors affecting the development of *P. glaucum*, the author states that the number and variety of organic compounds which in suitable concentration may serve as the carbon source in the development of *P. glaucum* is very large, but that highly oxidized compounds take no part in its development. The compounds which are harmless in moderate concentration are not all assimilable. A few aromatic compounds may serve as exclusive sources of organic nutriment for this fungus.

The occurrence of smut on the seed of some grasses. H. M. QUANER (Tijdschr. Plantenziekten, 19 (1913), No. 5, pp. 137-152, pls. 2). The author describes the occurrence of *Ustilago bromicarpa* on species of broom grass, particularly *Bromus unioloides*. It has been claimed that the beetle *Phalerus curvicauda*, through eating the spores of this smut, aids materially in keeping the disease under control, but the author believes that it is not so efficient as has been reported. For the control of the disease he recommends soaking the seed in a solution of copper sulphate or treating with hot water. Both of these methods have reduced the amount of smut, but the best results were obtained with the hot water treatment. Formaldehyde has also been recommended and has been used with some success.

The occurrence of rust spores in the interior of seeds of grasses. J. BEAUVREZ (Compt. Rend. Acad. Sci. [Paris], 157 (1913), No. 18, pp. 787-799). The author reports having observed pustules containing spores of rust in wheat, barley, *Bromus mollis*, and *Agropyron* spp. The presence of the rust in these seeds is believed by him to be of great importance when considered from the standpoint of the propagation of rusts.

Injury from rust fungi. D. HEYI (Kiskérlet. Közlem., 16 (1913), No. 4, pp. 544-553).—Experiments are said to show that several common treatments for smut fungi are ineffective, but that treating the seed with either 1 per cent copper sulphate or 0.13 per cent formalin is safely protective. It is also stated that injury due to stinking smut is probably much greater than has hitherto been thought, requiring a more thorough study of this fungus.

Longevity of loose smut of barley in case of infected seed. H. ZIMMERMANN (Ztschr. Pflanzenkrankh., 23 (1913), No. 5, pp. 257-269).—Reporting on a continuation of work previously noted (E. S. R., 25, p. 244), the author gives tabular results of experimentation with 18 varieties of barley during 1908 to 1912. He concludes that the ability of *Ustilago hordei* to develop loose smut in barley appears to depend largely upon the stage of development of the variety in question, the time as well as the violence of attack varying in dif-

ferent seasons; also that the smut may remain capable of development for about five years.

Effects on winter rye and wheat of treatment with corrosive sublimate. L. HILTNER (*Prakt. Bl. Pflanzenbau u. Schutz*, n. ser., 11 (1913), No. 8, pp. 101-104).—Continuing previous reports (E. S. R., 28, p. 846), the author gives the results of numerous practical experiments reported by farmers with the corrosive sublimate treatment. This is said to have been beneficial to both wheat and rye against *Fusarium*, but not against loose smut of wheat.

Corrosive sublimate as treatment for rye. K. GÄRF (*Prakt. Bl. Pflanzenbau u. Schutz*, n. ser., 11 (1913), No. 8, pp. 97-101, figs. 4).—Very favorable results are reported as following the use of corrosive sublimate against *Fusarium* on seed grains of winter rye in 1912 as recommended by Hiltner. The effects of Sublimoforn on the spring planting were not very decided, possibly on account of weather unfavorable to the development of the fungus.

The effect of formalin and copper sulphate solution on the germination of wheat. C. C. BRITTLERANK (*Jour. Dept. Agr. Victoria*, 11 (1913), No. 8, pp. 473-476, figs. 2).—The results are given of an experiment undertaken to ascertain the effect of time on the germination of wheat after treatment with formalin and copper sulphate solutions. Equal quantities of seed were soaked for 5 minutes in a solution of formalin, 1:300, and for 1 minute in a 2 per cent solution of copper sulphate. The seed was then removed from the solutions, dried, placed in clean bags, and tested at weekly intervals for 54 weeks.

Marked differences in vigor and growth of the plants were noted from the first. The control lot was the quickest to germinate, and gave an average of 95 per cent germination for the entire period. Next in germination and vigor was the seed treated with formalin solution, for which an average germination of 91 per cent was found. The highest percentage of germination for copper sulphate was 95 per cent at the end of the first week. Following this there was a gradual reduction in viability until at the end of the period only 32 per cent germinated.

This experiment indicates that seed should be sown as quickly as possible after treatment.

Connection between the acidity of the cell sap and rust resistance in wheat. O. COMES (*Atti R. Ist. Incoragg. Napoli*, 6, ser., 64 (1912), pp. 418-441; abs. in *Internat. Inst. Agr. [Rome]*, Mo. Bul. Agr. Intel. and Plant Diseases, 4 (1913), No. 7, pp. 1117-1119).—This work, dealing with results obtained previously by the author and others, is believed to justify the general conclusion that the biochemical factor which constitutes the means of resistance of an organ to disease may be estimated from the acidity of the cell sap; that this acidity, rather than density and compactness of tissues, enables plants to resist parasitic fungi; and that the normal production of sap more or less rich in sugars or in acid is hereditary, but capable of modification by cultivation, manuring, and elevation. It is claimed that the farmer should give attention to biological means, such as hybridization and selection, in order to increase the resistance of improved plants, in this way seeking to discover the varieties resistant for a given district. In order to preserve the highest degree of acidity in the cell sap and at the same time maintain fertility of soil the phosphatic fertilizers, especially superphosphates, should be used instead of nitrogenous manures.

Foot disease of wheat. REUTHER (*Deut. Landw. Presse*, 40 (1913), No. 65, p. 780).—This brief discussion of the appearance, predisposing conditions, and probable causes of foot or stalk disease of wheat, concludes with recommendations looking to protection therefrom, the principal of which are included in

careful selection and preventive treatment of seeds, sparing use of nitrogenous manures, suppression of weeds, rotation, and proper drainage.

Observations on foot disease of wheat. RUTHER (*Illus. Landw. Ztg.*, 55 (1913), No. 65, pp. 589-591).—The main substance of this report is contained in the article noted above.

Nematode disease of wheat. J. APPL (*Wiener Landw. Ztg.*, 63 (1913), No. 69, p. 787, figs. 3).—The author reports briefly on infection and other studies carried out on wheat in relation to *Tylenchus tritici* in Austria.

The nematodes are said to invade the seedling from the soil when very young and to be carried upward with its growth, breeding in immense numbers in the galls found in the heads. It is supposed, however, that they can infect young plants only at short distances (probably not over 10 cm.) from the original host plants. The galls, however, which are said to be almost the sole means of spreading the infection, are distributed and sown with the seed wheat, but it is suggested that by winnowing and other means they may be largely removed, lessening greatly the danger from nematodes.

A disease of peanuts. A. A. L. RUTGERS (*Dept. Landb. Vitr. en Handel [Dutch East Indies], Meded. Afdeel Plantenziekten*, 1913, No. 6, pp. 5, pls. 21).—A description is given of a disease of peanuts in Java that is believed to be identical with that described by Zimmerman from German East Africa (*E. S. R.*, 19, p. 448). No organism has been definitely determined as causing the disease, and experiments on its transmission and control have given negative results.

In addition to the peanut, the mungo bean (*Phaseolus mungo*), *Dolichos biflorus*, *Crotalaria verrucosa*, and probably *Tithonella rhomboides* are believed to be subject to this disease.

A contribution on changes in fleshy organs of plants due to micro-organisms. L. HAUMAN-MERCK (*Ann. Inst. Pasteur*, 27 (1914), No. 7, pp. 591-522).—As the result of a study of the relations between several fleshy plants and the organisms attacking them, the author states that in Argentina, as in North America, winter potato rot is caused by *Mucor stolonifer*; that infection, though ordinarily easy and quick in case of contused wounds, is unlikely in case of cut though unbruised tissues exposed to air, on account of rapid electrization in such cases; that whatever prevents or hinders such electrization in roots, tubers, leaves, etc., favors their immediate infection and possibly the development also of substances unfavorable to suberization; that, therefore, attack of an organ through a wound or bruise seems to depend upon the relative rate of development of the saprophyte in the superficial layers of contused cells and of suberin in the layers immediately beneath.

Leaf roll of potatoes. VI, G. KÖCK, K. KORSCHMANN, and O. BROß (*Ztschr. Landw. Versuchsw. Österr.*, 16 (1913), No. 3, pp. 89-149, pl. 1, fig. 1; *abs. in Bot. Centbl.*, 123 (1913), No. 8, p. 260).—The authors give results of their 1912 studies on potato leaf roll, which are said to confirm those previously given (*E. S. R.*, 27, p. 447). The trouble is claimed to be due to a parasitic *Fusarium*, which may invade the plant directly from the soil (primary infection), spreading in the vascular bundles to or throughout the tubers and developing in varying degree in the plants produced therefrom (secondary infection); or, not reaching the tubers but interfering with their nutrition, may simply dwarf these and successive crops therefrom. This trouble is claimed to be distinct from some others which wither or crinkle the leaves. It appears either early or late in the growing period. Numerous infection studies succeeded in reproducing the disease. No close relation to weather has been determined.

A list of the 1912 literature on this subject is appended.

Disorders and parasites of rice, L. GRANATO (*Bol. Agr. [Sao Paulo]*, 14, ser., 1913, No. 1, pp. 1-17).—This is a somewhat systematic general account of rice disorders as observed in Sao Paulo in recent years, including some observations on animal and cryptogamic parasites.

A sclerotial disease of rice, F. J. F. SHAW (*Mem. Dept. Agr. India, Bot. Ser.*, 6 (1913), No. 2, pp. 11-23, pls. 3).—The author states that *Sclerotium oryzae* has recently been demonstrated on rice in India, the attack manifesting itself through extensive tillering from the base of the infected culm. Inoculated laboratory plants died, while infected field plants were only weakened, failing to produce good seed. The fungus is said to show, according to the various substrata used, decided differences, these being most marked in the color and form of the hyphae. No trace of a perfect stage was observed. The sclerotia are thought to winter in the soil and to be practically beyond the reach of ordinary remedies. The breeding of resistant varieties of rice is suggested.

A bibliography is appended.

A disease of rice (*Agr. News [Barbados]*, 12 (1913), No. 298, p. 318).—This is a summary of the article above noted.

History of root rot or red rot of beets, A. STIFT (*Bl. Zuckerrübenbau*, 29 (1913), No. 15, pp. 225-239).—The author gives a condensed account of efforts to check this disease and of related writings during the last 60 years, closing with a reference to the means recommended by Eriksson (*E. S. R.*, 29, p. 50) for its control.

Recent studies with fertilizers as protective to beets against dry rot, heart rot, and nematodes, R. SCHANDER (*Bl. Zuckerrübenbau*, 20 (1913), No. 11, pp. 169-173; *Deut. Zuckerindus.*, 38 (1913), No. 7, pp. 154, 155; *abs. in Centbl. Bakt. [etc.]*, 2, Abt., 38 (1913), No. 7-12, pp. 246, 247).—The author states that calcium sulphate was ineffective as used against heart rot and dry rot of beets; that the free use of potassium, nitrogen, and phosphorus fertilizers increased considerably the yield of the beet crop on ground infested with nematodes; that shallow plowing as protection against nematodes was ineffective, proving also injurious to the beet crop where the above-named rots prevailed, and that the Kühn method of trap plants seems to be of limited adaptability for this purpose.

Protection against nematode injury, W. KRÜGER (*Centbl. Zuckerindus.*, 21 (1913), No. 15, p. 515; *abs. in Centbl. Bakt. [etc.]*, 2, Abt., 38 (1913), No. 7-12, pp. 167, 168).—In continuation of previous notes (*E. S. R.*, 27, p. 152) the author, discussing nematode injury to the beet crop and some difficulties of protection therefrom, states that field experiments have been continued at the experiment station at Bernburg to test the effects, as regards protection of variations in soil absorptivity, in case particularly of phosphorus and potassium and in general of the more available compounds. It is held that loss as regards quantity and quality of the product is less when the supply of available nutriment is more plentiful.

Tomato diseases, T. C. WENN (*Jour. Agr. [New Zeal.]*, 7 (1913), No. 1, pp. 46-52, figs. 2).—The results of experiments for the control of tomato diseases on plants grown under glass are given.

The tomatoes were sprayed with different fungicides, and from January until April were kept free from disease by the use of either Bordeaux mixture or Burgundy mixture. After April 5, owing to other work, a period of 3 weeks elapsed without spraying, when the tomato spot (*Cladosporium fulvum*) appeared on all the plants. Spraying with Bordeaux mixture at 10-day intervals held the disease in check, but the use of Burgundy mixture after April 5 was without any advantage.

The relation of fertilizers, temperature, and humidity to the disease are discussed and descriptions are given of nematode attacks, tomato spot, a disease called black stripe, and white fly injury.

Regarding the relation of fungus attack upon the foliage of trees to disturbances in roots and lower trunk, R. FARNETI (*Riv. Patol. Veg.*, 6 (1913), No. 4-5, pp. 97-107).—Discussing numerous examples cited, the author claims that functional disturbances, debility, and bad constitutional conditions generally do not necessarily predispose trees to fungus attack.

Diseases of the orchard, L. CAESAR (*Ann. Rpt. Fruit Growers' Assoc. Ontario*, 44 (1912), pp. 22-25, figs. 4).—Notes are given on black rot canker, apple scab, and pear blight, with suggestions for their control.

The transpiration of apple leaves infected with *Gymnosporangium*, H. S. REED and J. S. COOLEY (*Bot. Gaz.*, 55 (1913), No. 6, pp. 421-430, fig. 1). Substantially noted from another source (*E. S. R.*, 29, p. 647).

The apple rust (*Rpt. W. Va. Dept. Agr.*, 1913, No. 29, pp. 29-34, fig. 1). In a paper presented before the twentieth annual meeting of the State Horticultural Society attention is called to the rust of apples and its related form on cedars, with the object of reducing the occurrence of the disease as much as possible by the removal of cedar trees in the vicinity of orchards. It is stated that the disease can be controlled by proper spraying, but as the period when the application of the fungicide should be made is quite limited a more practical method of control is believed to be the elimination of the cedar trees.

The collar blight of apple trees, N. J. GIBBONS (*Rpt. W. Va. Dept. Agr.*, 1913, No. 29, pp. 15-19, fig. 1).—In a paper presented before the twentieth annual meeting of the State Horticultural Society, the author states that three troubles of apple trees, collar blight, winter injury, and root rot, are frequently met with and often confused.

The collar blight disease, it is said, may be detected in its early stages by a close inspection of each individual tree. The affected trees usually show a discolored area of bark just above the ground, and the bark is frequently sunken. By cutting into the bark it is found to be dead and black, and a reddish discoloration is observed where the wood and bark come together. At later stages in the progress of the disease the dead bark often becomes broken up and rot fungi easily gain access. An examination was made of a number of orchards, and a considerable proportion of trees of bearing age was found affected.

The only remedy at present known is that of cutting out and treating the diseased areas. Differences are noted in the susceptibility of varieties of this trouble, and it has been suggested that double working nursery stock has given relief.

A bacterial canker of plum twigs, I. M. LEWIS (*Trans. Amer. Micros. Soc.*, 31 (1912), No. 3, pp. 145-149, pl. 1).—The author states that a disease of plum trees, popularly known as canker, is quite prevalent in portions of Texas and is apparently identical with that which has been reported from Nebraska and Delaware (*E. S. R.*, 18, p. 244; 19, p. 445). Small cankers are observed on the wood of the first season's growth, and these enlarge until finally the twigs may become completely girdled.

A bacterium (*Pseudomonas pruni*) has been isolated and cultivated, and inoculation shows that it is responsible for the trouble. In addition it was found possible to produce typical cankers on young peach trees with the organism taken from the plum.

Physiopathological observations on the stigma of the olive flower, L. PETRI (*Mem. R. Staz. Patol. Veg. Roma*, 4 (1913), pp. 139-169, figs. 7; abs. in

Internat. Inst. Agr. [Rome], Mo. Bul. Agr. Intel. and Plant Diseases, 4 (1913), No. 7, pp. 1113, 1114).—It is stated that among the external causes which may provoke alteration in the stigmatic papillæ and bring about their death are rain and mist, which act by wetting the stigma and causing arrest or excessive reduction of the activity of respiration, transpiration, and assimilation, by bringing about a toxic accumulation of oxalic acid.

The biology of *Cycloconium oleaginum*, L. PETRI (*Mem. R. Staz. Patol. Veg. Roma*, 1913, pp. 136, figs. 37; *abs. in Internat. Inst. Agr. [Rome], Mo. Bul. Agr. Intel. and Plant Diseases*, 4 (1913), No. 7, pp. 1116, 1117).—The author gives results of studies carried on since 1905 with cultures of *C. oleaginum*, and discusses artificial nutritive media, germinating conditions of the conidia, enzym action of the fungus upon the cuticle of the olive leaves, and localization and development of the disease as related to conditions of receptivity in the leaves.

It is stated that *Cycloconium* can grow saprophytically, forming in cultures its chlamydo-spores and microsclerotia, the conidia forming only in case of an acid substratum. Conidia are said to germinate at temperatures between 2 and 32° C., but cultures may live at -15°.

Two enzymes, pectin and lipase, were isolated from the cultures, but no toxic substances were shown to be elaborated by the mycelium. This fungus does not develop on leaves which are about to fall. Its germination at low temperatures and the physiological conditions of the leaves in winter render infection at that season possible, especially in southern and littoral districts.

Diseases and enemies of cacao, L. BEILLE (*Jour. Agr. Trop.*, 13 (1913), Nos. 144, pp. 167-172; 145, pp. 193-197; 146, pp. 236-238).—Besides a brief notice of general disorders which may be more or less common to roots, stems, branches, leaves, and fruit of cacao trees, a discussion is given of certain diseases peculiar to each part, including more or less of the history, cause, symptoms, remedies, etc. A section is devoted to animal pests of the cacao tree.

Premature leaf fall of currant bushes, E. NOFFRAY (*Jour. Agr. Prat.*, n. ser., 26 (1913), No. 35, pp. 272, 273; *Rev. Hort. [Paris]*, 85 (1913), No. 18, pp. 426, 427).—The author discusses briefly an attack of *Glaeosporium ribis* on leaves of currant bushes, causing their early fall, followed by the development on the fallen leaves of *Pseudopeziza ribis*, said to be the perfect form of *G. ribis*.

Raspberry yellows and cane blight, J. E. HOWITT (*Canad. Hort.*, 36 (1913), No. 10, pp. 237, 238).—Descriptions are given of two serious diseases of raspberries that are said to be prevalent in Ontario.

The first, the cause of which is not determined, is called raspberry yellows from the general appearance of the affected plants. The first indication of the presence of this disease is said to be the curling downward of the margin of the upper leaves which later become mottled with yellow. As the disease progresses the plants become stunted and yellow and the berries dry up without ripening. This disease spreads rapidly through a plantation, and as yet no definite remedy is known.

The cane blight is due to a fungus, but it is not so widespread nor so serious as the yellows.

For both diseases the planting of healthy plants and the removal and burning of diseased specimens are about the only methods of control that are promising. The use of Bordeaux mixture or other sprays having failed to hold the diseases in check.

Treatment of court-noué with coal tar, LAMOUROUX (*Prog. Agr. et Vit. (Ed. l'Est-Centre)*, 34 (1913), No. 40, pp. 417-421, figs. 2).—A brief account is given with illustrations of the method and results of applying coal tar to grapevines

dwarfed by court-noué. The vines showed improvement the first year, and more decidedly the second year. After the third year's treatment the recovery is considered to be complete, the new growths being apparently normal as to development and product.

Development of downy mildew as related to conditions of the medium. O. MESSEZ (*Compt. Rend. Acad. Sci. [Paris]*, 157 (1913), No. 4, pp. 292-294).—Observations made at the station for agricultural meteorology at Perpignan are said to show that in this region, where the winds predominant in periods of mildew outbreak are from the sea, the localities of greatest infection are the elevations most exposed to sea winds presumably bearing comparatively few spores; this is apparently because of the greater humidity and warmth, favoring germination. In the observation period in question it is held that the two days of northwest showers conferred receptivity upon the grape stocks and that three days of warm moist winds from the northeast and southeast developed the infection.

Summarizing the conclusions arrived at from recent studies, the author concludes that the presence of mildew and degree of its attack depend upon general causes, such as variations of atmospheric conditions, which may be wide spread; upon secondary causes, including such factors as the nature and vitality of the stock, the composition of the soil, and exposure of the situation; and upon accidental causes, such as fertilizers, dressings, and the presence of overflow water.

The white rot of grapes and its treatment. L. DUCRUEY (*Prog. Agr. et Vit. (Ed. l'Est-Centre)*, 34 (1913), No. 36, pp. 289-291, pl. 1).—According to the author, the white rot due to *Coniophthora diplodiella* is particularly destructive to the fruit of certain varieties of grapes. The fungus is considered to be semi-parasitic, usually attacking the fruit and vine through wounds.

Spraying for black rot or mildew will at the same time protect against the occurrence of the white rot. The fungicides for this purpose should contain a large amount of copper.

This fungus, unlike the *Botrytis* which causes the gray rot, is said not to produce any oxidizing enzymes, and as a result does not affect wine.

Diseases of *Azalea indica*. H. BENNISEY (*Gartenwelt*, 17 (1913), No. 36, pp. 499; 500).—A brief discussion is given of the injury to *A. indica* by *Fulvia septica*, requiring the removal of the slime mass and application of potassium nitrate; by *Septoria azalea*, Bordeaux mixture of 1 per cent strength being recommended as a preventive measure; by an *Exobasidium* of undetermined species, no remedy being prescribed; and by leaf fall ascribed to means used for securing rapid growth. Several injurious animals are briefly discussed.

Carnation stem rot. H. W. ANDERSON (In *Floriculture Research at the Experiment Station*. Urbana: Univ. Ill., 1912, pp. 15-22).—This is a paper presented before the annual meeting of the Illinois State Florists' Association and consists of an account of observations and experiments on the carnation stem rot due to *Rhizoctonia*. An outline is given of experiments in progress relating to this disease, and a number of other fungus troubles are briefly mentioned.

Infection experiments with *Phoradendron villosum*. K. von TIEBER (*Naturh. Ztschr. Forst u. Landw.*, 11 (1913), No. 3, pp. 171, 172; *abst. in Bot. Centralbl.*, 123 (1913), No. 12, p. 293).—Attempts to grow *P. villosum* on several European trees named gave no further results in any case than germination of the mistletoe seed. See also a previous note (*E. S. R.*, 20, p. 213).

Notes on black canker of chestnut. E. BARSALI (*Riv. Patol. Veg.*, 2 (1913), No. 4-5, pp. 107-110).—Referring to recent reports by Peiri (*E. S. R.*, 20, p. 156) and others on black canker of chestnut, the author contributes some observations

regarding the presence and effects of *Coryneum* and other fungi on chestnut trees, stating no absolute conclusion at this time, but insisting on early attention being given to the root system in this connection.

Cryptogamic leaf diseases of Hevea in America, V. CATLA (*Jour. Agr. Trop.*, 13 (1913), No. 144, pp. 186-188).—The author, noting briefly several studies made on the parasitism of *H. brasiliensis*, states that *Dothidella ulei* appears to attack most readily and severely plants reduced in vitality by unfavorable conditions. The disease is reported from the upper Amazon, but not in very severe form.

A blight of the mesquite, F. D. HEALD and I. M. LEWIS (*Trans. Amer. Micro. Soc.*, 31 (1912), No. 1, pp. 5-10, pl. 1).—A disease of mesquite (*Prosopis glandulosa*) has been under the authors' observation for several years. It is said to be quite abundant in the vicinity of Austin, Tex., and thought probably to occur throughout the range of this species.

The leaves are affected soon after the leaflets attain mature size, and in the early stages the leaflets show a form of chlorosis which begins at the margin and tip and advances until the midrib is reached. The general condition is such as is popularly designated as rust.

The fungus could not be referred to any known genus, and the authors have proposed for it the name *Scleropenium aureum* n. g. and sp., a technical description of which is given.

The occurrence of the larch canker on Corsican pine, A. D. HOPKINSON (*Quart. Jour. Forestry*, 7 (1913), No. 4, pp. 287-290, pls. 2).—The author reports on the prevalence of the larch canker (*Dasyctypha scillkomitii*) on the Corsican pine. Of 100 trees examined, 90 showed signs of having been attacked by the fungus, but a few of the larger specimens that had been infected had overcome the disease and the wounds had begun to heal. In addition to the Corsican pine (*Pinus laricio*), this fungus is said to attack also the Scotch pine (*P. sylvestris*) and the Austrian pine (*P. austriaca*) in the same neighborhood.

An adherent spraying liquid, A. LECOMTE (*Rev. Vit.*, 40 (1913), No. 1027, pp. 225-228).—Noting the contributions of Vermorel and Dautony (*E. S. R.*, 20, p. 850) in regard to employment of casein to promote adherence in fungicidal sprays, the author reports the successful use for this purpose of this substance in its natural solution, milk. The mixture, it is claimed, was found to be entirely homogeneous when made with the percentage of copper usual in such sprays. A mixture of 2 per cent copper sulphate, 1 per cent lime, and 2 per cent milk in the aqueous solution is said to be satisfactorily adherent and not prohibitively expensive under favorable circumstances.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

A text-book of agricultural zoology, F. V. THEOBALD (*Edinburgh and London*, 1913, 2. ed., rev., pp. XX+536, figs. 257).—A revised edition of this work (*E. S. R.*, 11, p. 427).

The present status of the heath hen, G. W. FIELD (*Bird Lore*, 15 (1913), No. 6, pp. 352-358, figs. 9).—This paper relates to the occurrence of the heath hen, which has been exterminated except upon Martha's Vineyard. It is stated that 6 years' experience proves that the protected reservation is an efficient method for increasing the numbers of this grouse without artificial propagation.

The destruction and dispersal of weed seeds by wild birds, W. E. COLLIER (*Jour. Bd. Agr. [London]*, 20 (1913), No. 1, pp. 15-26).—In order to determine to what extent birds are instrumental in disseminating weed seeds, droppings were collected and placed upon sterilized soil and covered with a little fine soil. One hundred and thirty-three plants representing 7 species developed from 54

droppings of the house sparrow; 52 plants representing 7 species developed from 38 droppings of the greenfinch; and 96 plants representing 9 species developed from 50 droppings of the bullfinch.

In the discussion the author reviews and quotes from the literature on the subject.

The food of some British wild birds, W. E. COLLINGS (London, 1913, pp. 171-109).—This work is based upon investigations extending over many years, during which period numerous observations were made in the field and of the stomach contents of upwards of 3,000 adult birds and 300 nestlings. Among the more important subjects dealt with are methods of examination, including observations of the food of nestling birds (E. S. R., 28, p. 450); results of studies of the food of 29 species of birds; birds as destroyers and as distributors of weed seeds, as noted above; birds in relation to forestry; legislation, protective measures; etc.

A bibliography of 114 titles is appended and an index is included.

[Animal pests, etc., in Colorado] (Off. State Ent. Colo., 1913, Circs. 7, pp. 85, figs. 10; 8, pp. 13, figs. 3; 9, pp. 8, pl. 1, fig. 1).—Of these circulars (E. S. R., 28, p. 450), No. 7 consists of the Fourth Annual Report of the State Entomologist for the year, 1912, by C. P. Gillette and G. P. Wedon; No. 8, a Report on Prairie Dog Investigations in Colorado, in continuation of work previously noted (E. S. R., 28, p. 652); and No. 9, a discussion of The Wyoming Spermophile or Ground Squirrel (*Citellus elegans*), the last two circulars being by W. L. Burnett. Reports upon the orchard, nursery, nursery stock, and apary inspection work during the year, and papers on the fruit tree leaf roller in Colorado (E. S. R., 28, p. 450) and upon rodent investigations for 1912 (E. S. R., 28, p. 652) are included in the entomologist's report.

[Notes on insects of economic importance in Germany], K. ESCHMANN and W. BAER (Naturw. Ztschr. Forst u. Landw., 11 (1913), Nos. 2, pp. 98-109, figs. 3; 3, pp. 121-123, figs. 2; abs. in Rev. Appl. Ent., 1 (1913), Ser. A, No. 10, pp. 371-373).—These notes relate to the sawfly *Pachygonatus montanus* as a new enemy of the pine; the pine as a food of *Lophyrus borealis*; the number of eggs deposited by *Lyda stellata*; injury of *Hepilus humuli* to the hickory (*Carya alba*); the longicorn beetle *Ergates fuler* as a pest of pine fence posts, etc.; and a heavy infestation by *Palaeococcus fuscipennis*.

Insects injurious to sugar cane in British Guiana, and their natural enemies, G. E. BODKIN (Jour. Bd. Agr. Brit. Guiana, 7 (1913), No. 1, pp. 29-32).—This paper lists 32 species of insects injurious to sugar cane in British Guiana and their natural enemies.

Insects attacking the pine, P. LESNE (Jour. Agr. Prat., n. ser., 25 (1913), No. 6, pp. 179-182, pl. 1; 7, pp. 213-215, fig. 1).—This is a brief account of the more important insect enemies of the pine in France.

Insects and disease, C. WELLMAN (Amer. Jour. Trop. Diseases and Prev. Med., 1 (1913), No. 5, pp. 346-350).—A brief discussion with references to the literature.

Infectious diseases and invertebrate transmitters, F. MESSLI (Bul. Inst. Pasteur, 11 (1913), Nos. 5, pp. 185-196; 6, pp. 233-244).—This paper presents a list of the invertebrates concerned, and a review of the infectious diseases conveyed by insects and other invertebrates and of the invertebrates and the micro-organisms which they convey. A bibliography of 61 titles is appended.

[Plant inspection in Florida], E. W. BERGER (Univ. Fla. Off. Insp. Nursery Stock, 1911, Circs. 1, pp. 8; 2, p. 1; 1912, Circs. 3, pp. 15, fig. 1; 4, p. 1; 1913, Circ. 5, pp. 2).—These circulars relate to the rules and regulations governing plant inspection work in Florida.

East African termites, II. MOWATT (*Pflanzer*, 9 (1913), Nos. 3, pp. 130-141, pls. 3; 9, pp. 443-464, pls. 3).—The first part of this paper consists of a general discussion of termites; the second part relates to the Natal termite (*Termit natalensis*) and other species which attack rubber trees.

The croton bug (*Ectobia germanica*) as a factor in bacterial dissemination. W. B. HERMS and Y. NELSON (*Amer. Jour. Pub. Health*, 3 (1913), No. 9, pp. 929-934, fig. 1).—It is pointed out that the croton bug (*E. germanica*), which feeds by preference upon the food of man, is commonly found in situations where infective sputum or excrement exists, and that it is structurally equipped to collect filth and bacteria upon its appendages, though this equipment is not as effective as in the house fly. It has the ability to pick up bacteria on its feet and mouth parts and deposit these on human food. The bacterial population of a single croton bug was found to be a minimum of 13,370 bacteria.

"The croton bug carries more bacteria upon its hind pair of legs than on its middle and fore legs combined. The croton bug is normally nocturnal in habit though it may be active during the day, and is more or less omnivorous in food habit. The eggs of the roach are laid in pairs (13 pairs usually) in an egg case which is carried for several months by the female. The young roaches require evidently not less than one year to mature and probably more.

"The usual trapping methods are not very effective in the control of the croton bug. Sweet mixtures containing borax or flour and plaster of Paris with water available are recommended as good remedies."

Monograph of the Gryllidae of Formosa with a review of the Japanese species. T. SHIRAKI (*Monographie der Grylliden von Formosa, mit der Uebersicht der Japanischen Arten*. Taihoku, Formos.-Gart., 1911, pp. 129, pls. 2).—A synopsis of the family in which a large number of species are described as new.

Nine new Thysanoptera from the United States. J. D. HOOD (*Proc. Biol. Soc. Wash.*, 26 (1913), pp. 161-166).—Of the nine species here described as new *Lothrips montanus* from the currant and gooseberry at Bozeman, Mont., is of economic importance.

The thysanopterous cecidia of Java and their inhabitants. H. KARNA and W. and J. VAN LEEUWEN-REIJNVAAN (*Bul. Jard. Bot. Buitenzorg*, 2, ser., 1913, No. 10, pp. 126, figs. 86).—The authors first discuss the cecidia from a botanical standpoint (pp. 1-54), following which they deal (pp. 55-123) with the 47 species and subspecies of thrips concerned, of which 20 forms are described as new.

Froghoppers. J. C. KERSHAW (*Dept. Agr. Trinidad and Tobago Bul.*, 12 (1913), No. 72, pp. 3-12, pls. 3).—These miscellaneous notes make up Special Circulars 3 to 7.

The vermilion egg parasite of the froghopper has not been reared in captivity during the dry season in sufficient numbers to give any great encouragement that it will check the froghopper. In addition to the use of the green muscardine fungus, which has given good results in the past and is now being used on a large scale, the author suggests 3 other means of combating the pest. (1) the application of nitrolim (calcium cyanamid); (2) kerosene-lysol emulsion (lysol 3 oz., kerosene 9 oz., and water 4 gal.); and (3) the removal and destruction of dry leaves on which the eggs may have been deposited. The notes include a discussion of the male genital armature of *Tomaspis*.

The sugar cane froghopper and biological notes on some cercopids of Trinidad. F. W. CAUCH (*Dept. Agr. Trinidad and Tobago Bul.*, 12 (1913), No. 72, pp. 12-51, pls. 7, figs. 9).—This report reviews records of froghoppers in other countries; gives a discussion of the origin and distribution of the sugar cane froghopper, its life history and habits, natural enemies, and artificial

control; and biological notes on *Tomaspis rubra sororia*, *T. pubescens*, *T. guppyi* n. sp., *T. postica*, and *Clastoptera lanata*.

[Froghoppers in Trinidad], J. C. KERSHAW ET AL. (*Dept. Agr. Trinidad and Tobago Bul.*, 12 (1913), No. 73, pp. 95-106, pls. 2, figs. 12). These notes relate to mating, oviposition, estivation of eggs, manner in which the froghopper feeds, the green muscardine fungus, etc.

Bearing of the vermilion froghopper egg parasite, F. W. URECH (*Ibid. Agr. Trinidad and Tobago, Circ.* 7, 1913, pp. 7; *abs. in Rev. Appl. Ent.*, 1 (1913), Ser. A, No. 3, pp. 116, 117).—The methods employed in rearing the egg parasite of this froghopper in Trinidad are described.

The froghopper egg parasite (*Oligosita giraulti*) and its colonization in the cane fields, F. W. URECH (*Ibid. Agr. Trinidad and Tobago, Circ.* 11, 1913, pp. 9).—This paper presents additional data on the froghopper egg parasite, which has been described by Crawford as *O. giraulti*. It embodies the results of rearings of the parasite under laboratory conditions from February to June, including notes on its life history, habits of the adult parasite, multiplication, etc.

On a remarkable gall-producing psyllid from Syria, R. NEWSTADT and B. F. CUMMINGS (*Ann. and Mag. Nat. Hist.*, 8, ser. 11 (1913), No. 63, pp. 396-398, pl. 1, fig. 1).—The author describes a pod-shaped gall, found some 8 miles from Beyrout on a twig of what is thought to be a tamarind, and the larva and pupa of a species of psyllid belonging to the subfamily Trioctinae, which it contained.

The rosy apple aphid (*Aphis sorbi*), serious pest, H. F. WILSON (*Better Fruit*, 7 (1913), No. 12, pp. 17, 18).—This aphid is said to be by far the most serious plant louse attacking fruit trees in Oregon. The species, a native of Europe, probably imported to this country on nursery stock, has now spread to most of the apple-growing sections of the United States, and is said to be generally distributed in Oregon.

In this paper the author reports studies of its life history and habits so far as determined during 2 seasons' work. The winter is passed in the egg stage, the stem mothers hatching out just as the buds begin to open in the spring. The aphids usually attack the leaves surrounding the fruit clusters, but in years when the crop is light may be found almost anywhere on the leaves. Their attacks result in the production of deformed apples, this apparently being due to the extra supply of juices drawn into the leaves and absorbed by the aphids. Unlike the green apple aphid this species seldom attacks the young growing shoots.

In experiments conducted during the spring of 1911 applications of blackleaf 40 and of blackleaf 40 combined with lime-sulphur have been found to be efficient, but lime-sulphur (1:10) alone failed to have any effect upon the aphids. It is stated that spray thoroughly applied at the time the buds are commencing to open will prevent from 95 to 100 per cent of aphid infestation.

Report on the distribution of the grape phylloxera (*Phylloxera vastatrix*) in Austria in 1910, 1911, and 1912, as well as on the work and results secured in reestablishing infested vineyards, together with the laws, orders, and exemptions dealing with the phylloxera (*Ber. Verh. Reichs Anst.*, 1310-1912, pp. 332, pl. 1).—This report, which covers the various grape-growing centers of Austria, is in continuation of the report previously noted (E. S. R., 25, p. 341).

The beet plant louse in northern France, A. MARQUIN and A. MOUTIÉ (*Vie Agr. et Rurale*, 2 (1913), No. 24, pp. 696-699, figs. 7; *abs. in Internat. Inst. Agr. [Rome]*, Mo. Bul. Agr. Intel. and Plant Diseases, 4 (1913), No. 7, p. 1125).—*Aphis papaveris* has appeared in large numbers in northern France during the

last few years, especially in 1911, and has been a source of considerable damage to beets. The authors confirm the observations of Mordwilko, who considers this species to be the same as that found on *Euonymus europæus* in spring and known as *A. cuonymi*.

Notes on coccids which attack the coconut palm and other plants cultivated on a large scale in Mahé, Seychelles, P. R. DUPONT (*Abd. in Rev. Appl. Ent.*, 1 (1913), Ser. A, No. 4, pp. 129, 130).—Seven species of *Lecanium* are mentioned as occurring in the Seychelles. A species of fungus of the genus *Hypocrella* is said to attack these scales; a species of *Microcera* attacks *Diaspis pentagona*, which injures the leaves of plum trees and the trunks of papaws; and *Cephalosporium lecanii* parasitizes *Lecanium vride*, which has caused the disappearance of almost all the thorn-bearing trees in the Colony.

Some field notes on a soft gray scale known locally as the "longulus" scale, D. KELL (*Mo. Bul. Com. Hort. Cal.*, 2 (1913), No. 8, pp. 617-619).—Biologic notes and a brief report in tabular form upon experimental fumigation work are given. See also a previous note (E. S. R., 28, p. 452). The results indicate that there is a good chance of obtaining a fairly high destruction of this scale by fumigating between July 20 and the end of August.

The tobacco caterpillar (*Prodenia litura*), C. R. JONES (*Philippine Agr. Rev. [English Ed.]*, 6 (1913), No. 9, pp. 425-432, pl. 1, figs. 2).—This noctuid is said to be the greatest pest of tobacco in the Philippines, the larvæ attacking growing tobacco, both young and old, but causing the greatest damage to the young leaves. This paper presents an account of its life history and habits with remedial measures.

The cotton worm in Egypt, G. C. DUDGEON (*Bul. Imp. Inst. [So. Kensington]*, 10 (1912), No. 4, pp. 584-620, pl. 1, fig. 1).—A summarized account of *Prodenia litura* (*lituralis*) including its synonymy, distribution, life history, control, etc.

Recent work on the polyhedral body disease of caterpillars, K. ESCHENICH (*Naturw. Ztschr. Forst u. Landw.*, 11 (1913), No. 2, pp. 86-97, fig. 1).—This is a critical review of recent literature on the wilt disease of caterpillars.

The rice caterpillar (*Laphygma frugiperda*), G. E. BOOKIN (*Jour. Rd. Agr. Brit. Guiana*, 6 (1913), No. 4, pp. 172-183).—In British Guiana the fall army worm is an extraordinarily destructive pest, occurring in countless numbers in the young rice nurseries when the plant is at the most critical stage of its growth. If control measures are not immediately taken it destroys the entire nursery in a short time. In this paper the author deals with its distribution, life history, natural enemies, and means of control.

A serious Philippine orange moth (*Prays citri*), E. O. ESSIG (*Mo. Bul. Com. Hort. Cal.*, 2 (1913), No. 11, pp. 722, 723, fig. 1).—The larvæ of this pest is said to live just beneath the rind next to but not in the pulp of the cajel, a variety of the native orange, and to produce gall-like swellings which remain opened at the outside but do not seem to penetrate the pulp at all.

A pest of oranges (*Agr. News [Barbados]*, 12 (1913), No. 302, p. 378).—A small moth, apparently a tortricid, is reported to have become a pest of oranges in Dominica through penetrating the skin and living and feeding in the pulp.

The gunworm of the grape (*Sciopteron regale*), F. MASKEW (*Mo. Bul. Com. Hort. Cal.*, 2 (1913), No. 10, pp. 677-679, figs. 2).—This paper presents descriptions of the stages of a lepidopteran reared from grape twigs collected in the Orient and intercepted at quarantine.

The transmission of verruga by *Phlebotomus*, C. H. T. TOWNSEND (*Jour. Amer. Med. Assoc.*, 61 (1913), No. 19, pp. 1717, 1718).—The author reports the results of a preliminary transmission experiment in which 2 hairless dogs of the species *Canis carabicus* were used. One cc. of serum containing the triturated bodies of 20 females of *Phlebotomus verrucarum*, a biting gnat occurring in

the verruga zones of the Peruvian Andes, was injected in the right shoulder of one of the dogs, the other dog being reserved as a check. The symptoms resulting showed the disease to have been transmitted to the infected dog, while the check animal showed nothing abnormal.

This is said to be the first experimental demonstration of insect transmission of the disease.

The gall midge fauna of New England, E. P. FELT (*Psyche*, 20 (1913), No. 5, pp. 135-147).—Of some 900 species of gall midges known from America, the author lists 137 as occurring in the New England States.

The box cecidomyiid (*Monarthropalpus buxi*), J. CHAINE (*Ann. Sci. Nat. Zool.*, 9. ser., 17 (1913), No. 5-6, pp. 289-359, pls. 3, figs. 26).—This paper relates to the morphology, biology, injury, and remedial measures for this cecidomyiid, which burrows in the leaves of the box (*Buxus sempervirens*).

The life history of *Thrypticus muhlenbergiae* n. sp., O. A. JOHANSSON and C. R. CHOSBY (*Psyche*, 20 (1913), No. 5, pp. 164-166, fig. 1).—The larva of this dipteran lives in the stems of *Muhlenbergia sylvatica* in the vicinity of Ithaca, N. Y.

The biology of *Tabanus striatus*, the horsefly of the Philippines, M. B. MITZMAIN (*Philippine Jour. Sci., Sect. B*, 8 (1913), No. 3, pp. 197-221, pls. 7).

"The eggs of *T. striatus* have been found in masses of from 270 to 425, laid mainly on particles of wood. The incubation period has been determined to be from 3 to 5 days. The behavior of the larva indicates that it is essentially an aquatic form. The insect in this stage has been found to be extremely cannibalistic. In some instances as high as 85 per cent of the brood has been destroyed by this means. They apparently prefer their kind to any other food; at least there is no diminution of the practice even when an abundance of other food is present. There is shown to be a marked diversity in the development of larvæ of the same age. The larval period covers 6 weeks or longer.

"In the ecdyses of *T. striatus* there are 3 distinct molts: the final one causing a considerable time after the larva is full grown, results in the molting of the puparium. The puparium is formed beneath the molting skin of the full grown larva. This stage lasts from 3 to 7 days, with an average of 5½ days, in the male; and from 4 to 9 days, with an average of 6 days, in the female. In this period the male can be distinguished by the arrangement of the short spines anterior to the terminal teeth of the abdomen. These form a continuous serrated border of from 10 to 12 short spines. In the female these spines occur in 2 groups of from 4 to 6 each. Evidence of development of the adult fly is had in the changes of coloration visible through the puparium. . . . In from 15 to 20 minutes after emergence the imago takes flight. . . .

"All of the draft animals of the Philippines serve as hosts for *T. striatus*. The carabao appears to be the host of choice. The rain trees of this locality serve to harbor great numbers of resting horseflies. In considering methods of eradication, this fact should be considered."

The mechanical transmission of surra by *Tabanus striatus*, M. B. MITZMAIN (*Philippine Jour. Sci., Sect. B*, 8 (1913), No. 3, pp. 223-229; *Philippine Bur. Agr. Bul.* 28 1913, pp. 11).—"T. striatus for the first time recorded has been found to play a rôle in the transmission of surra. Bred horseflies have been employed for the first time in such experiments. Errors resulting from naturally infected wild flies have thus been eliminated. Three experiments were successful in the direct or mechanical transmission by 'interrupted' feeding when only a short interval was allowed between the bites on infected and healthy animals. In 16 experiments the minimum number of flies with which the infection could be transmitted was 2.

"Trypanosomes of surra were not found to be transmitted hereditarily in *T. striatus* Fabricius. The contaminated labellum of the fly does not appear to be a factor in the conveyance of infection. The maximum length of time that *Trypanosoma evansi* has been demonstrated microscopically in the gut of this species of fly after feeding on infected blood is 30 hours; the organisms were found in the fly's defects 24 hours after biting the infected animal; and suspensions of flies, when injected subcutaneously, were found infective for animals for a period of 10 hours after the flies had fed on infected blood."

Stages in life history of warbles, C. VANEY (*Abstr. in Jour. Roy. Micros. Soc. [London], 1913, No. 5, p. 480*).—The author distinguishes 4 larval stages in species of Hypoderma, (1) the boring larva which emerges from the egg, traverses the mucous membrane of the alimentary canal, and lodges in the submucosa; (2) the migratory larva which develops in great part in the submucosa of the gullet, migrates in the connective tissue to the subcutaneous tissue, and finally perforates the dermis; (3) a short third stage, sedentary in the skin, and breathing atmospheric air; and (4) the final stage, which lasts for 3 months and is sedentary until the host is left.

It is concluded that all the facts regarding *H. bovis* confirm the theory of Hinrichsen and Curtice that the parasite enters cattle by the alimentary tract exclusively.

Flies as carriers of *Lambli*a spores.—The contamination of food with human excreta, C. W. STILES and W. S. KEISTER (*Pub. Health Rpts. [U. S.], 28 (1913), No. 48, pp. 2530-2533*).—The authors present evidence to show that the house fly is capable of carrying *Lambli*a spores. "If flies can carry *Lambli*a spores measuring 10 by 7 μ , and bacteria that are much smaller, and particles of lime that are much larger, there is no ground to assume that flies may not carry *Entamoeba* and *Trichomonas* spores."

Flies and disease in the British army, S. WESTCOTT (*Jour. State Med., 21 (1913), No. 8, pp. 480-488*).—This general account includes observations made by the author.

Control measures for the olive fly, CHAPPELLE (*Bul. Mens. Off. Renscig. Agr. [Paris], 11 (1912), No. 12, pp. 1703-1707*).—This is a summary of the results of observations and experiments by the Oleiculture Service in France during 1912.

The Anthomyiidae, J. SCHNABL and H. DZIEDZICKI (*Abhandl. K. Leopold. Carolin. Deut. Akad. Naturf., 95 (1911), No. 2, pp. 55-358, pls. 35*).—A revision of the family Anthomyiidae taken in its widest sense. Special consideration is given to the male genitalia, the plates consisting of drawings of the hypopygia. Descriptions of a large number of new species are included.

A synopsis of the dipterous groups Agromyzinae, Milichiinae, Ochthiphilinae, and Geomyzinae, A. L. MELANDER (*Jour. N. Y. Ent. Soc., 21 (1913), No. 4, pp. 283-300, pl. 1*).—A continuation of the paper previously noted (*E. S. R., 20, p. 657*).

The importance of the rat flea in determining the distribution of bubonic plague, S. KITASATO (*Berlin. Klin. Wchnschr., 50 (1913), No. 41, pp. 1881-1884; abstr. in Jour. Amer. Med. Assoc., 61 (1913), No. 21, p. 1939*).—The author confirms the efficacy of the method of collecting rat fleas by turning guinea pigs loose in the infected buildings. During the course of work at Kobe in 1909-10 guinea pigs collected infected fleas in 11 of 42 houses supposed to have been thoroughly disinfected after cases of plague, thus proving that the disinfection had not been complete. One hundred and twenty-two guinea pigs which were turned loose in 36 other houses from which rats had been exterminated and the buildings made absolutely rat proof collected but one flea and no signs of infection were found.

The western twig borer (*Amphicerus punctipennis*), E. O. ESSIG (*Mo. Bul. Com. Hort. Cal.*, 2 (1913), No. 10, pp. 681-684, figs. 3).—A brief summarized account of this coleopterous borer, which attacks the algaroba (*Prosopis juliflora*), apricot, pear, etc.

Two ladybirds injurious to potato plants, R. W. JACK (*Rhodesia Agr. Jour.*, 11 (1913), No. 1, pp. 77-82, pl. 1).—The author states that two species of *Eptischia* (*E. dregei* and *E. hirta*), which normally feed on certain wild species of solanaceous plants in Southern Rhodesia, have developed a taste for the potato and are a common source of injury.

Psyllodes attenuata, the hop or hemp flea beetle (*Verhandl. K. K. Zool. Bot. Gesell. Wien*, 63 (1913), Nos. 1-2, pp. 1-25, figs. 15; 3-4, pp. 98-100, figs. 10).—This paper consists of 2 parts. The first by F. Tölg deals with the morphology and biology of the immature stages; the second by F. Heikertinger with the imago, including injury and preventive measures.

The Mexican cotton boll weevil (*Anthonomus grandis*), E. W. BENDER (*Univ. Fla., Off. Insp. Nursery Stock, Circ.* 6, 1913, pp. 24, pls. 7, figs. 4).—A general account of the boll weevil, including means of control.

Utilization of entomophagous parasites in combating disease conveying insects, E. BRUMPT (*Ab. in Ann. Méd. Vét.*, 62 (1913), No. 7, pp. 402-410).—In discussing the importance of *Ixodiphagus caucurci*, a parasite of ticks recently described as new (*E. S. R.*, 27, p. 564), the author states that he has met with considerable success in the experimental infestation of several species of ticks. At Chantilly, Department of Oise, as high as 17 per cent of the nymphs of *Ixodes ricinus* on deer were found to be parasitized by it, and at Fontainebleau under similar conditions as high as 10 per cent. At the latter place two nymphs of *Hamaphysalis concinna* were also discovered to be parasitized. Experimentally he succeeded in parasitizing 95 per cent of *I. ricinus*, 60 per cent of *Dermacentor reticulatus*, 90 per cent of *Rhipicephalus sanguineus*, and 100 per cent of *D. venustus*.

Notes on the biology of this parasite, of which the author has reared four successive generations in five months, are included.

The life history and habits of *Spalangia muscidarum*, a parasite of the stable fly, H. PINKUS (*Psyche*, 20 (1913), No. 5, pp. 148-158, pl. 1, fig. 1).—It is stated that the adults of this parasite, recently described as new (*E. S. R.*, 29, p. 359), are scavengers from habit, preferring to feed on the remains of the host, and that it is not necessary to furnish prepared food in rearing cages. It is said to be a simple parasite, and does not usually deposit a second time in a single host. In addition to the stable fly, the house fly, horn fly, *Helicobia quadrisetosa*, and *Pseudopnyctelia cornicina* have been parasitized experimentally. That the stable fly is the principal host of this parasite appears to be due to its breeding habits. Breeding is said to progress well at 76° F. and somewhat higher temperatures. The adults become inactive at from 55 to 60°.

It is possible to propagate these parasites artificially in large numbers throughout the winter and liberate them early in the spring. By this means the first generation of flies may be cut down to a great extent, and this aids in the control of the flies throughout the year.

A breeding cage, modeled by the author and found to be quite practical for the breeding of this parasite, is described and illustrated.

Descriptions of ten new genera and twenty-three new species of ichneumon flies, H. L. VIEZICK (*Proc. U. S. Nat. Mus.*, 44 (1913), pp. 555-568).—Among the more important species described as new are *Apanteles laspyrexia*, reared from *Laspeyresia torenta* on *Pinus ponderosa* at Shasta, Cal.; *A. phycodis*, a parasite of *Phycodes radiata*, and *A. plusia*, a parasite on *Plusia agrogramma*, both at

Bangalore, India; *Meteorus laphygmae*, reared from the fall army worm at Brownsville, Tex., and which may prove to be only a race or variety of *M. hypantria*; *Perilitus elcoidis*, reared from *Bleodius suturalis* at Argonia, Kans.; *A. congregatus*, reared from *Ceratomia catalpa* at Greenville, S. C.; *A. empretia*, reared from (*Empretia*) *Sibine stimulea* at Washington, D. C.; *Opius anastrephae*, reared from *Anastrepha* sp. at Mayaguez, Porto Rico; *Encospius heliothisis*, a parasite of *Heliothis obsoleta*, at Deli, Sumatra; *Mesochorus plusiophilus*, which is a hyperparasite and probably parasitic on *Apanictes plusia* or on a *Meteorus*, at Bangalore, India; *Pezomachus perniciosus*, reared from cocoons of *Meteorus laphygmae* at Brownsville, Tex.; *Phygadeuon epochra*, a parasite on *Epochra canadensis* at Bozeman, Mont.; etc.

Descriptions of six new genera and twelve new species of ichneumon flies, H. L. VIERECK (*Proc. U. S. Nat. Mus.*, 44 (1913), pp. 639-648).—The new species include two fruit fly parasites from India, namely, *Asobara orientalis* n. sp. and *Diachasmimorpha comperi* n. g. and n. sp.

Another red species of the genus *Oligosita*, J. C. CRAWFORD (*Canad. Ent.*, 45 (1913), No. 9, pp. 311, 312).—A parasite reared from the eggs of *Tomaspis varia* in Trinidad is described as *Oligosita giraulti* n. sp.

The egg parasite of the small sugar-cane borer, G. E. BODKIN (*Jour. Bd. Agr. Brit. Guiana*, 6 (1913), No. 4, pp. 183-198, pls. 4).—A species of *Trichogramma*, closely related to *T. pretiosa* and *Chortosicha nana*, is deemed the most effective of the several parasitic enemies of *Diatraea saccharalis* in British Guiana. In the present paper the author deals with its life history and habits.

As many as 5 parasites may develop in a single egg of the sugar-cane borer. 3 being an average number. The author confirms previous observations, which show that the female *Trichogramma* is capable of producing a parthenogenetic generation, the progeny invariably being males. Eighty adults which developed from 100 ovipositions was the maximum number of parasites produced by a single female.

Introduction to the study of the myriapods, C. E. PORTER (*Introducción al Estudio de los Miriápodos. Santiago, Chilo, 1911, pp. 68, figs. 22*).—This is an illustrated account of the morphology, biology, classification, and economic importance of myriapods. It includes a list of the 64 species described from Chilo and a bibliography of the more important literature.

FOODS—HUMAN NUTRITION.

The meat supply of the German Empire—an investigation of the causes and effects of the increased cost of meat and means of overcoming it, J. B. ESSLER (*Die Fleischversorgung des Deutschen Reiches. Eine Untersuchung der Ursachen und Wirkungen der Fleischteuerung und der Mittel zur Abhilfe. Stuttgart, 1912, pp. 224; rev. in Ztschr. Agrarpolitik, 11 (1913), No. 10, p. 322*).—As the subtitle indicates, this book is a study of the conditions leading to the increased cost of meat in Germany and of means of increasing the supply so that the per capita consumption need not fall below the Voit dietary standard. The reduction of duties on cereals as a means of encouraging home production of meat, and the dependence of Germany on Argentina for meat in case of war, are among the topics discussed.

The price of meat in Paris, P. VINCEY (*Le Prix de la Viande. Paris, 1912, pp. 151, pls. 6, figs. 57*).—This book, privately printed, gives the results of a study of meat prices as shown in the official market reports of the Prefecture of the Seine and of the Police. The three points especially investigated were, the variations in the wholesale and retail prices of meat; the rise in price brought about by the retail sale of meat in small city shops; and the distribution among

producers and intermediaries of the proceeds of the sale of meat products in Paris.

The author estimates that of the price paid by the retail buyer, 76 per cent goes to the original producer, while, of the remaining 24 per cent, 2 per cent goes to the railways, 1 per cent to the cattle commissioners, 5 per cent to the city of Paris (for duties, slaughterhouse fees, market facilities, etc.), 3 per cent to the wholesale dealers, and 13 per cent to the retail dealers.

The appendix includes plates showing the method of cutting meats and the names of cuts in vogue in the Parisian markets.

The red color developed when meat is boiled in water, KITT (*Mitt. K. Landesanst. Wasserhyg. Berlin-Dahlem*, 1913, No. 17, pp. 26-29; *abs. in Chem. Zentrbl.*, 1913, II, No. 13, p. 1162).—The red color was noted in meat cooked in soft to medium hard water flowing from zinc-coated pipes and containing variable quantities of free carbon dioxide and occasionally very small quantities of nitrates.

The experiments showed that the presence of minute quantities of N_2O in the water was sufficient to cause a red color and explained the observed red color in boiled meat as due to the presence of minute quantities of N_2O produced by the reduction of nitrates by zinc in the presence of free carbon dioxide. The author recommends that water which has stood in the pipes for a long time should not be used for cooking purpose but allowed to run for a time before using.

The Tellier method of preserving dried meat, LALLÉ (*Deut. Schlacht u. Viehhof Ztg.*, 13 (1913), No. 43, pp. 655, 656).—In this summary of an article in *La Nature* a method of preserving meat is described which consists essentially of drying it in vacuum until about 20 per cent of the water is removed, which requires from about 12 to 24 hours. The process is said to be inexpensive, while the nutritive value and culinary quality of the meat are unchanged.

The author states that such partially dried meat keeps well under ordinary conditions.

Seasonings and bouillon cubes, K. MICKO (*Ztschr. Untersuch. Nahr. u. Genussm.*, 26 (1913), No. 7, pp. 321-329).—Analytical data are reported and discussed.

The chemical composition of rye and its milling products—the distribution of the materials in the grain, M. P. NEUMANN, H. KALNING, ET AL. (*Ztschr. Gesam. Getreidew.*, 5 (1913), No. 2, pp. 41-50).—Determinations were made of the composition of specially selected typical samples of the whole grain and the various milling products of rye. The proportions of soluble to insoluble protein and of various sugars and pentosans to the total starch, nonnitrogenous extractives, crude fiber, phosphoric acid, etc., found in the different milling products are noted in detail.

The chemical composition of wheat and its milling products—the distribution of the materials in the grain, H. KALNING and A. SCHLIMMER (*Ztschr. Gesam. Getreidew.*, 5 (1913), No. 7, pp. 199-207).—This work is carried out on the same lines as that of Neumann on rye, noted above.

The authors suggest the importance of a more extended knowledge of the various milling products for the sake not only of making technical improvements in the milling processes, but also of a better understanding of nutritive value. The significance of ferments in the grain during both storage and bread making is also indicated.

The bread making qualities of domestic [German] and foreign wheats, M. P. NEUMANN (*Ztschr. Gesam. Getreidew.*, 5 (1913), No. 8, pp. 223-226, *figs. 11*).—Bread making tests were made to determine the behavior of characteristic mixtures of German and foreign wheats. In general, the addition of the hard foreign wheats increased the bread making qualities of the domestic flour.

Indian edible swallows' nests, H. ZELLER (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 86 (1913), No. 2, pp. 85-106).—Analytical data are reported, particularly with reference to the nitrogenous constituents present.

Grecian honey and wax, E. I. EMMANOUEL (*Ber. Deut. Pharm. Gesell.*, 23 (1913), No. 6, pp. 395-410; *abs. in Chem. Zentbl.*, 1913, II, No. 14, p. 1249).—This article reports in a more accessible form material previously published in Greek (*E. S. R.*, 28, p. 862). (In this note the author's name was incorrectly spelled.)

The manufacture of chocolate, R. VALLIER (*Rev. Gén. Chim.*, 15 (1912), No. 12, pp. 213-223, *figs.* 8).—This article, which is illustrated with cuts of machinery, deals with the raw materials utilized in the manufacture of chocolate, the usual methods for manufacturing this commodity, the manufacture of soluble cocoa and various other specialties, and the amount of chocolate consumed in various countries. In 1906 the United States consumed the largest quantity of these products.

Modern fruit ethers, E. WALTER (*Pure Products*, 9 (1913), No. 11, pp. 543-549).—The character and uses of fruit ethers are discussed and formulas are given for making "the most commonly used [artificial] fruit ethers."

[Inspection of foods, dairy products, and feeding stuffs], W. D. SAUNDERS ET AL. (*Quart. Rpt. Dairy and Food Comr. Va.*, 1913, June-Aug., pp. 60).—Data regarding the analysis of miscellaneous samples of foods and beverages, inspection work, and other activities are reported.

Extracts from the report of the inspection service, etc., C. H. KITSER (*Chem. Weekbl.*, 10 (1913), No. 37, pp. 806-812).—This article is taken from official reports for the year 1912 regarding the examination of foods and other materials as conducted by the Office of Public Health in Holland. The subjects mentioned include milk, bread, Rangoon beans, lemonade sirups, jams, saccharin, preservatives, distilled liquors, etc.

The adulteration of sugar products as defined by Italian legislation, L. GARELLI (*Ann. R. Accad. Agr. Torino*, 55 (1912), pp. 255-292).—A discussion of Italian laws, municipal regulations, etc., relating to the adulteration of foods made with sugar.

Scientific standards for the governmental regulation of foods, J. R. MITCHELL (*Pop. Sci. Mo.*, 83 (1913), No. 4, pp. 344-354).—A plea that the scope of governmental control over food materials be so extended as to make it necessary for all those offered for sale to bear on their labels their energy value and percentage of protein.

What the Department of Agriculture is doing for the housewife, A. D. HOLMES (*Alumni Bul. Univ. Va.*, 3, ser., 6 (1913), No. 4, pp. 546-554).—The activities of the Department which are of interest to the housewife, particularly the nutrition investigations of the Office of Experiment Stations, are discussed in this address, which was delivered before the Rural Life Conference, University of Virginia, July, 1913.

Division of labor between country and city in the production of animal food materials as an aid to the regulation of the cost of living, F. FALKET (*Mitt. Ökonom. Gesell. Sachsen*, 1912-13, pp. 167-197, *figs.* 11).—This address, delivered before the Saxon Society of Economics, February, 1913, gives a description and discussion of the cooperation which has been successfully organized between a rural association of hog breeders and the cities of Ulm and New Ulm (Bavaria).

The breeders' association agreed to furnish a given number of hogs of given average weight at a fixed price. The 2 cities provided land and buildings for a fattening station, made a loan to the association for the feed used in fattening, and regulated the sale of the fattened animals in the

2 cities. The hogs thus supplied furnished about one-seventh of the amount annually consumed and were regularly distributed in different districts by arrangements with the butchers' associations and retailed at a price below the prevailing one. The profits to both dealers and breeders are considered just, though the latter naturally varied with the price of feed.

Retail prices, 1890 to June, 1913, F. C. CROXTON (*U. S. Dept. Labor, Bur. Labor Statis. Bul. 132, 1913, pp. 134*).—This publication, which is No. 10 of the Retail Prices and Cost of Living Series, contains a summary of data regarding retail prices of food in different States in the United States from 1890 to June, 1913.

Data are also given regarding the scaling weight (i. e., weight of dough before baking) as well as the prices of the principal brands of baker's wheat bread as reported by representative bakeries, and some statistics regarding the cost of coal and gas.

[Storage and the housekeeper's problems] (*Proc. Amer. Warehousemen's Assoc., 21 (1911), pp. 160-163, 232-253, pls. 2, figs. 2*).—Among the papers presented at the annual meeting held in Chicago in December, 1911, several are of interest to housekeepers, namely: Cold Storage for Household and Personal Effects, by Aspinwall; Economic Results of Cold Storage, by G. K. Holmes; and Effects of Temperature on Changes in the Flesh of Poultry, by Mary E. Pennington.

Exhibiting, classifying, and judging homemade products, J. B. S. NORTON (*Hyattsville, Md., 1913, pp. 52*).—This pamphlet, which was prepared while the author was in charge of the home products exhibit of the Maryland Horticultural Society, discusses the management of exhibits and related topics, awards, and rules for judging, and gives some directions regarding the preparation of fruit products and a collection of score cards for canned fruits, jellies, preserves, and other fruit products.

The economy administration cook book, edited by SUSIE R. RUDOLPH and GRACE P. HOPKINS (*Hammond, Ind., 1913, pp. 696, pls. 36*).—It has been the purpose, in collecting material for this volume, to include recipes for inexpensive dishes and to present other data which would aid the homemaker in economical as well as good living. The recipes have been contributed by a very large number, including many women of prominence. A considerable number are quoted from the Wilson Family Cook Book. Many menus are included, as well as discussions of preparing and preserving food and other topics, such as an expensive and an inexpensive luncheon regarded as equally attractive and palatable and of practically the same nutritive value, by Mrs. T. R. Marshall, home luncheons and lunch box combinations, by Emma S. Jacobs, and a list of articles which should be served with the proper items in a menu.

The twentieth century book for the progressive baker, hotel confectioner, ornamenteer, and ice cream maker, F. L. GIENANDT (*Boston, 1913, 2. ed., pp. 274, pls. 53, figs. 127*).—This volume, which consists largely of recipes and directions for the preparation of food, is designed especially for the use of bakers and professional cooks. The author has summarized his experience in various matters, among others the use of powdered milk, which he has found in general to be satisfactory.

Diet in health and disease, J. FRIEDENWALD and J. RUTENFRAH (*Philadelphia and London, 1913, 4. ed., rev. and enl., pp. 857+16*).—The authors state that in preparing this edition (*E. S. R., 17, p. 579*) several new sections have been added, including those dealing with the mechanism of digestion, salt metabolism, duodenal alimentation, and the use of the soy bean, while other sections have been revised, including those on metabolism and the prescribing of diet, infant feeding, and several sections dealing with diet in disease. New tabular

Matter and diet lists have been prepared and other changes made. These and other matters are discussed at some length in the preface to this edition.

The child—its care, diet, and common ills, E. M. SILL (*New York, 1913, pp. VII+207, figs. 34*).—A brief but fairly complete guide in the intelligent care of infants and small children. The 40 or more pages devoted to feeding outline the general principles regarding the diet of children and give definite practical suggestions as to their application. The relation of diet to the more common disorders of childhood is also noted.

The proper diet in the Tropics, with some pertinent remarks on the use of alcohol, A. C. EUSTIS (*Amer. Jour. Trop. Diseases and Prev. Med., 1 (1913), No. 4, pp. 283-293*).—The author holds that there is greater danger from an excessive use of meat in tropical than in temperate regions, because "ptomaines", which may be produced from undigested meat by the action of putrefactive bacteria in the colon, and which under ordinary conditions would be "rendered inert by the liver cells", would not, in his opinion, be so taken care of where there is little severe exercise, as is the case with most residents in warm regions.

He believes further that in such regions "there is little need of internal combustion to maintain the body temperature."

Similar arguments are given against the use of alcohol.

In the author's opinion, not more than 40 gm. of protein per day should be eaten in the Tropics. He believes that the energy value of the daily diet should be from 2,000 to 2,500 calories, depending upon the muscular work done, fats being taken in moderation and the energy supplied largely from carbohydrates; that vegetable proteids are preferable to animal proteids; and that the diet should contain an abundance of fruits and vegetables.

The desirability of limiting the amount of meat in the diet is illustrated by a case cited in which symptoms of toxemia in a patient were overcome by reducing the meat consumption and which the author considers typical of many which he states have come under his observation.

Meat feeding experiments with mice and their value as a means of determining the harmfulness of suspected meat upon the health, R. REINHARDT and E. SEIBOLD (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 12 (1913), No. 4, pp. 332-350*).—The literature relating to feeding experiments with diseased meats is reviewed and the results are given of a series of experiments in which white mice were fed upon meat which had been infected in some instances with *Bacillus paratyphosus* and in others with *B. enteriditis*, the infections having undergone various stages of development.

From the results of these experiments, the authors conclude that white mice are not suitable subjects for such experiments and that neither positive nor negative results of the feeding of suspected meat to white mice will permit the drawing of conclusions relative to the fitness for human food of the meat in question.

Creatin and creatinin in total and partial fasting, V. SCAFFIDI (*Arch. Biol. Biol., 59 (1913), No. 2, pp. 161-172*).—Studies were made of creatin and creatinin and of total nitrogen exchange in feeding laboratory animals (dogs) on a mixed diet, in total fasting, and in a diet in which the nitrogen was replaced by fats.

During fasting a variable quantity of creatin appeared in the urine, while under normal conditions of nitrogen equilibrium little or none was found. The quantity of nitrogen eliminated in these experiments and derived from the combustion of tissue was greater than that eliminated during maintenance upon a mixed diet sufficient to maintain body weight. More creatinin was elimi-

nated than under normal conditions. The percentage of creatinin nitrogen decreased with the increase of total nitrogen; consequently, the elimination of this substance is not proportional to the total nitrogen. If, however, creatin nitrogen be considered as creatinin nitrogen, the total of such nitrogen is nearly that of the normal percentage of creatinin nitrogen.

When the nitrogen of the normal mixed diet is replaced with fat, the organism tends to retain nitrogen which is eliminated in smaller proportions than in mixed feeding or in total fasting. The quantity of creatinin eliminated is also smaller, but the appearance of small quantities of creatin is not prevented. The daily percentages of creatin nitrogen and creatinin nitrogen vary less than in complete fasting. There appears to be a relation between endogenous nitrogen and creatin and creatinin. Therefore, the quantity of creatin eliminated is not proportional to the amount of nitrogen ingested.

Purin metabolism with diminution of the processes of oxidation in the organism, V. SCAFFIDI (*Arch. Ital. Biol.*, 59 (1913), No. 2, pp. 172-179).—The experiments here noted were made with 2 types of laboratory animals, those (dogs) in which the uric acid eliminated is the result of oxidation and those (ducks) in which it is of synthetic origin. In both groups, the animals were previously kept on a purin-free diet and then made to inhale air containing different amounts of carbon dioxide and oxygen.

When the conditions determining a temporary variation in the processes of oxidation had thus been controlled, it was found that they had no influence on the uric acid metabolism of the dogs. In the experiments with ducks, however, temporarily limiting the oxidation of the tissues caused an increased formation of uric acid. This fact is to be explained by assuming either that the slight uricolytic power of the ducks is lessened by the conditions of the experiment or that the synthesis of uric acid is facilitated by the products of the breaking down of the protein molecule.

Purin metabolism during fasting, V. SCAFFIDI (*Arch. Ital. Biol.*, 59 (1913), No. 2, pp. 180-192).—Ducks and dogs were used in these experiments as types of animals in which the uric acid eliminated was formed by synthesis and oxidation, respectively.

In the case of ducks, the author concludes that the uric acid eliminated represents from 42 to 53 per cent of the total nitrogen metabolized. During fasting and overfeeding it follows closely the variations of total nitrogen. The proportion of total to uric nitrogen rose during high feeding and fell during complete fasting.

In the case of dogs, fasting produced only slight modifications in the purin metabolism, the quantity eliminated diminishing without any apparent relation to the total nitrogen.

The problem of intermediary purin metabolism.—I. The storage of purin in the liver and its relation to the excretion of uric acid, H. ROSENBERG (*Ztschr. Expt. Path. u. Ther.*, 14 (1913), No. 2, pp. 245-254, fig. 1).—This article describes experiments made with the surviving livers of dogs and planned to show the effect of atophan on the storage and metabolism of purin bodies in the liver. Its effects in cases of gout, etc., under different dietary conditions are also touched upon.

The problem of intermediary purin metabolism.—II. Concerning uric acid puncture, E. MICHAËLIS (*Ztschr. Expt. Path. u. Ther.*, 14 (1913), No. 2, pp. 255-261, fig. 1).—These experiments were made with rabbits on which the operation known as the Claude Bernard sugar puncture had been performed. The operation increased the allantoin and also the total nitrogen content of the urine notably.

●The conclusion is drawn that the center affected controls the purin metabolism as well as that of sugar, and indirectly influences the secretion of nitrogen. Hence, the operation might be correctly designated as uric acid puncture.

The effect of water ingestion on the fatty changes of the liver in fasting rabbits, M. R. SMIAHOW (*Amer. Jour. Physiol.*, 32 (1913), No. 6, pp. 309-314).—This paper, delivered before the Washington meeting of the American Association of Pathologists and Bacteriologists, May, 1913, describes experiments made with fasting rabbits to some of which no water was given. The author summarizes the changes in the livers as follows:

"Fasting, unwatered rabbits, from 4 days and upwards, show a decided fatty infiltration of the liver, apparent in gross and microscopically. Fasting, watered rabbits, from 10 days and upwards, may show similar changes in the liver, but the percentage of incidence is very low as compared with that of the unwatered animals.

"In half the number of fasting, watered rabbits under observation, microscope vacuolation was observed. This vacuolation may be interpreted as a fatty change, but the picture is by no means comparable to that seen in the unwatered animals."

The problem of fermentation and putrefaction in the human intestines during the administration of different types of diet as indicated by chemical analysis of the feces, H. FISCHER (*Ztschr. Expt. Path. u. Ther.*, 14 (1913), No. 2, pp. 179-244).—The studies on which this article is based were made with patients suffering from chronic constipation and receiving special diets, viz. a milk diet, vegetable and fruit diet, diet unusually rich in protein, diet unusually rich in fat, and the so-called Schmidt intestinal test diet (a simple mixed semi-invalid diet). The acidity or alkalinity of the feces was determined and also their content of volatile fatty acids, free and total ammonia, neutral fats, sulphuric acid, amino acids, mercaptan, etc., the hope being thus to throw light on the bacteriological conditions of the intestines as the result of the different diets.

Among the more significant points in the author's summary is the fact that the milk diet, the fruit and vegetable diet, and those rich in protein or in fat all yielded feces with noticeably high ammonia content. This indicates that the latter is not due simply to the decomposition of protein in the food, but may be caused, as in the case of the fruit and vegetable diet, by the prolonged retention of cellulose in the intestines and the increased putrefactive changes therein, or, as in the case of the fat diet, by the stimulation of the pancreas and other glands by the higher fatty acids and soaps and the irritation of the intestinal mucus by the lower fatty acids.

Calcium and phosphorus in growth at the end of childhood, HERBST (*Ztschr. Kinderheilk., Orig.*, 7 (1913), No. 8-4, pp. 161-192; *abs. in Zentbl. Expt. Med.*, 4 (1913), No. 10, p. 446).—Of the 2 subjects (14-year old boys) studied one was strong and the other less well developed.

Calcium and phosphorus metabolism were determined during long intervals. With the stronger subject there was a calcium oxid retention of 0.4543 gm. per day, equivalent to 165.3 gm. per year. With the less well developed boy the retention was 0.2172 gm. daily, or 79.3 gm. per year. These values are about the same as those calculated on theoretical assumptions.

Phosphoric acid retention in growth is apparently dependent upon calcium and also upon nitrogen retention.

Calorimetric observations on man, J. S. MACDONALD (*Rpt. Brit. Assoc. Adv. Sci.*, 1912, pp. 286-290).—These experiments were reported by the committee appointed by the British Association for the Advancement of Science to make calorimetric observations on man in health and in febrile conditions. They

were made with the calorimeter previously described (E. S. R., 27, p. 367). The usual temperature readings were made at 5-minute periods.

From these observations "the heat output of the subject (plus any heat arising from a subsequent conversion of mechanical work into heat) was calculated for each 5-minute period and the results plotted as curves. By correction from observation these curves, altered by allowances for the storage of heat in the subject, were converted into heat-production curves—that is to say, curves representing the total transformation of energy within the calorimeter." These curves of heat output are "parallel to the surface temperature curves obtained simply by one set of observations during the first half hour of each 'work experiment,' that is to say, so long as the observations of surface temperature are not complicated by the accumulated presence of surface moisture, and in some of the extremely light 'work experiments' continue in parallel fashion to the end of the experiment whilst showing corresponding variations at nodal points. . . .

"It would thus seem as if the transformation of energy per unit of mechanical work performed was a quantity that increased up to a certain value which was then maintained, and that the 'efficiency' of man as a machine varied in this fashion with the time spent in work. . . .

"If it is not the case, then two other lines of explanation have in addition to be examined. Thus it may be that the 'deep temperature' (rectal) is not a satisfactory criterion of the mean temperature of the human body and does not therefore provide a proper basis for corrections representing its average storage of heat during any short period (5 minutes) of time. It might, on the other hand, be the case that energy liberated during the performance of mechanical work as the outcome of oxidation processes developed as fully at the commencement as at the end of the experiment might be stored within the body, possibly within the musculature, in some form other than heat, as, for example, in the form of electrical energy, and therefore not discoverable by reference to changes of temperature."

In view of these considerations, the data obtained after the first hour were used in estimating the maintained efficiency of the subjects. The total transformation of energy in calories per subject per hour was calculated.

Previous calibration experiments with the cycle ergometer as driven by a special motor furnished the data for estimating the value in calories of the mechanical work performed by the subjects. Comparing the figures for the second and the fifth hours, an increment of work performance of 29.5 calories per hour was found in the subjects, the increment of increase in their total energy transformation for the same period being 119, 121, and 120 calories, respectively.

"It is clear, in the first place, that the 'efficiency' of these 3 different persons of different ages (45, 24, 36) and of quite different physical appearance and habits is almost the same, and in the second place that it is at least . . . of the magnitude of 24.6 per cent."

The energy produced by the processes of oxidation in the organism; physiology of muscular work, R. HÜBER (*Ztschr. Elektrochem.*, 19 (1913), No. 18, pp. 733-746).—This paper, delivered at the meeting of the Bunsen Society of Applied Physical Chemistry, Breslau, August, 1913, is a summary of the advance made in the knowledge of the chemo-dynamics of muscle from the time of Fick to the present.

According to the author, a muscle is to be regarded as a chemodynamical and not a thermodynamical machine, since it has so high an effectiveness that one would have to take into account extremely high temperatures if a thermodynamical explanation were offered.

* The chief work reaction which causes contraction depends upon the formation of lactic acid. As yet the origin of the lactic acid is not known. Probably it does not come directly from glycogen or from dextrose. When muscle is stimulated and fatigued, the lactic acid disappears, oxygen being taken up and carbon dioxide given off, not, however, by means of simple combustion but through the regeneration of the lactic-acid-yielding substances coupled with an oxidative process. Muscular contraction is apparently brought about by a swelling which is itself brought about by the presence of the acid. The laws of the increased volume phenomena are the same as those for the dilution of concentrated solutions. In this case, as in the case of the muscle, practically all the energy changes can be noted as work.

A discussion follows the paper.

The influence of the temperature of the surrounding air upon carbon dioxide excretion in man—a contribution to the subject of heat regulation, L. Sjöström (*Skand. Arch. Physiol.*, 30 (1913), No. 1-3, pp. 1-72, figs. 13).—Extended investigations are reported which led to the following conclusions:

Variations in the carbon dioxide excretion of a fasting man at rest, though not absolutely without muscular movement, are not influenced by surrounding temperature, so long as shivering is absent. Shivering causes an increase in the oxidation processes of the body for the purpose of maintaining constant body temperature, the increase being proportional to the intensity of such movement. The increased heat production caused by such means is not sufficient to maintain constant temperature in the body when heat is withdrawn in large quantities. Shivering is probably brought about, too, by nervous reaction in which the temperature condition of the skin plays a part. Whether or not higher temperatures than the surrounding air, 30 to 31° C., caused changes in the intensity of metabolism could not be determined from the experimental data reported. The author is of the opinion that possibly individual peculiarities had an effect upon this.

The influence of body position upon respiration in man, G. LILJESTRAND and G. WOLLIN (*Skand. Arch. Physiol.*, 30 (1913), No. 1-3, pp. 199-223, figs. 3).—According to the conclusions drawn by the authors from their investigations, respiration is influenced in a typical way by the body position, even in a condition of muscular rest and fasting.

Both the frequency and the volume per minute are greatest when standing, less when sitting, and still less when lying down. The number of respirations per minute was lower when lying upon the stomach than when lying upon the back. The changes in ventilation are in large measure directly dependent upon the change in frequency of respiration. The changes in frequency and in ventilation when frequency was constant for different body positions were not caused by variations in carbon dioxide production.

ANIMAL PRODUCTION.

Problems of genetics, W. BATESON (*New Haven, Conn., and London, 1913, pp. IX+258, pls. 3, figs. 11*).—The chapters included in this volume are as follows: The problem of species and variety; meristic phenomena; segmentation; the classification of variation and the nature of substantive variation; the mutation theory; variation and locality; local differentiation; climatic varieties; the effects of changed conditions; the causes of genetic variation; and the sterility of hybrids.

Experimental studies of the inheritance of color in mice, C. C. LITTLE (*Carnegie Inst. Washington Pub. 179, 1913, pp. 11-102, pls. 5*).—The conclusions of

the author of this treatise, which is divided into 2 parts, are based on personal observations made on more than 10,500 mice, the experiments dating from November, 1907, to May, 1912.

Part 1 (pp. 11-46) is a consideration of the factors producing color in mice. These are classified as formative and distributive color factors. "The 3 general pigment-producing regions in mice were found to be the eye, the skin, and the hair, the pigments produced being limited to yellow, brown, and black. Color is attributed to the formation of melanin pigment, the product of an oxidation process. It is explained that "the presence of certain distributive factors, or modifications of them, determines what color varieties of mice shall be formed. These distributive factors determine either the total amount of pigmentation or the relative amounts of yellow, brown, and black that are visible."

Relative to the inheritance of spotting the author states that "experimental evidence does not support a theory which postulates the common origin of white produced by spotting and that produced by albinism." It is further explained that "present knowledge of spotted forms is too scanty to decide whether spotting is due to a process of loss of the factor for uniformity of pigmentation, or to a hypostatic restrictive factor. It seems, however, that such spotting as one encounters in guinea pigs, hooded rats, and in many mice, is a unit character subject to enormous quantitative fluctuation, and that it may be considered due to a modification of the factor Y or L which is hypostatic to unmodified or 'self' forms."

The observation of Morgan that "in crosses between self and spotted forms, in mice, the spotting seemed modified or contaminated by the cross," was corroborated. In crosses with Japanese waltzing mice, "the spotted individual of F_1 have been contaminated by the cross, having their dorsal pigmentation increased on the average more than 50 per cent over the average of the pure Japanese race." Relative to "whether the various characters are completely independent of each other or whether coupling or gametic association of any sort exists between some of them," it was observed that experiments show no sign of association in the gametes between the several factors or between the 4 conditions characteristic of their absence.

Part 2 of this treatise (pp. 47-102) treats in detail of the experimental data obtained.

Heredity of tricolor in guinea pigs. H. D. Goswami and T. H. Morgan (*Amer. Nat.*, 47 (1913), No. 558, pp. 321-348, figs. 1-15).—Investigations carried on by the authors since 1908 to determine how the different types of tricolor in guinea pigs behave when mated to each other are reported.

With regard to the question of the heredity of black and white somatic areas, it is concluded that such an area or spot is "a center from which color, if present, is more likely to spread, and, if we assume somatic segregation in an early stage of the embryo the extent of the spot will be a measure of the extent to which a given cell containing the color factor multiplies as compared with neighboring areas that have the white factor. In pigeons the dark wing-bar of some breeds may be white in other breeds, although pigment is present elsewhere. We can not assume, of course, a pigment producer to be absent from the germ. It seems more probable that there are special color producers, which if present in the germ, and therefore in all the body cells, give a definite reaction in that region where a white band is formed. In this case there is no localization factor inherent as such, i. e., there is no need to assume somatic segregation, but only germinal segregation of a particular special factor that is realized in a special part. The substitution of a white area for a colored one in guinea pigs might

be looked at in the same way; but the extent to which the spot develops is a more difficult, and perhaps, a different problem."

Reversion in guinea pigs and its explanation, W. E. CASTLE (*Carnegie Inst. Washington Pub. 179, 1913, pp. 1-10*).—The author summarizes the results of his investigation as follows:

"The agouti coat characteristic of wild cavies and of most other wild rodents is dependent upon the presence in the fur of black pigment disposed in a definite pattern with red (or yellow). The factors which control, respectively, the development of black pigment and the production of the agouti pattern are independent of each other. The agouti coat is obtained only when both these factors are possessed by an individual. Only such agouti individuals as are homozygous in both factors breed true under all circumstances."

"An agouti animal which is homozygous in *A* (the agouti factor), but heterozygous in *B* (black pigmentation), may produce agouti young and red ones, but not black. An agouti animal which is homozygous in *B*, but heterozygous in *A*, may produce agouti young and black ones, but not red. An agouti animal heterozygous in both *A* and *B* may produce 3 sorts of young, agouti, red, and black. All *F*₁ (reversionary) agoutis produced by crossing black with red are of this sort. Agoutis of the other 3 sorts are obtained only in the second or later generations of agouti young."

Reciprocal crosses between Reeves pheasant and the common ring-neck pheasant producing unlike hybrids, J. C. PHILLIPS (*Amer. Nat., 47 (1913), No. 563, pp. 791-794, fig. 1*).—It is shown that, unlike the case of many birds (fowls, pigeons, canaries, and doves) which give evidence of sex-linked characters, the pheasant hybrid shows "merely a different appearance of male sexual plumage character in the *F*₁ hybrids of a reciprocal cross between Reeves pheasant and the common ring-neck pheasant." This phenomenon evidently does not occur in the reciprocal crosses of other species of pheasants. No explanation is offered for the present case.

Some points of genetic interest in regeneration of the testis after experimental orchectomy in birds, C. J. BOND (*Jour. Genetics, 3 (1913), No. 2, pp. 131-139, pls. 2, figs. 5*).—In investigations of the results of unilateral oophorectomy in rabbits, the writer observed that "the removal of one ovary in the female rabbit is followed by a compensatory overgrowth in the remaining ovary, and further that this hypertrophy affects both the Graafian follicles or ova-bearing cells and the internal secretion-forming cells." It was found that in birds "the same process occurs in the remaining testis after unilateral orchectomy."

It was further observed "in both male fowls and pigeons that when one or both testes were removed intracapsularly—that is to say, when the testicular substance had been apparently wholly removed and the capsule alone left, a regeneration of the secreting tissue of the testis and the tubuli seminiferi took place within the capsule so evacuated. . . . This regeneration must take place either from the capsule, or more probably from microscopic fragments of secreting tissue which are left adhering to the capsule at the time of the operation." The testis of the domestic fowl apparently has greater powers of structural and functional regeneration after partial removal than exists in mammals.

With regard to "whether the gametes which are formed in this tissue resemble, in their hereditary characters, the gametes which are formed by the original gland before removal," the author's investigation seems to indicate "that the cell divisions of the motor sperm cells which provide the new spermatozoa formed during regeneration of the testis do not take place in exactly

the same order, or are not exactly of the same kind as those which form the sperm cells before removal of the sex gland."

It is suggested that further experiments should be made to confirm these conclusions and to determine other relations existing in the reproductive system of the fowl.

The segregation of fecundity factors in *Drosophila*. E. N. WESTWORTH (*Jour. Genetics*, 3 (1913), No. 2, pp. 113-120).—With a view to studying the effects of inbreeding upon fecundity and general vigor, the author conducted breeding experiments with flies. Four lines of breeding were started. "The largest and most vigorous males were mated with the largest and most vigorous females, the rather weak and small flies were mated together, and 2 lines of medium type, 1 based on size and the other on apparent vigor were also established."

After 9 generations, the breeding record of line 1 (a line lacking in vigor and high fecundity) presented a mean of 29.5 and a standard of variation of 7.31; line 2 (strongly vigorous), mean 135.86 and standard deviation 18.3; and line 3 (medium in size) and line 4 (medium in vigor), mean 72.06 and standard deviation 37.1618. From this the author concludes that "a segregation of fecundity factors is clearly evidenced and the supposed weakness from inbreeding are shown up in their true light as the mere segregation of factors for lower vigor."

It was further observed that "the male, whether he come from high or low lines, apparently in nowise influences the eggs laid by the female with whom he pairs, though marked differences, apparently due to segregation, may occur among his female descendants." The reciprocal crossing of strains high and low in fecundity, instead of resulting in 3 single groups, which might have been expected from previous calculations, showed at least 7. No evidence of sex linkage of fecundity factors appeared.

Determination of sex. E. TANSKY (*Hoard's Dairyman*, 46 (1913), No. 15, pp. 420, 421).—After an investigation of the 3-year records of over 600 head of cattle, to determine the percentage of males and females born by months, the author concludes that the month of birth favors no special sex.

Chemical composition of Roumanian and Russian sunflower seed cake. M. GÓSKY (*Ztschr. Landw. Versuchsw. Österr.*, 16 (1913), No. 3, pp. 141-145). Comparative analyses were made at the experiment station at Dublany, near Lemberg, of 2 varieties of sunflower seed cake, as follows: Roumanian cake, protein 27, fat 12.51, nitrogen-free extract 21.14, crude fiber 24.93, and ash 5.64 per cent; Russian cake, protein 33.01, fat 11.33, nitrogen-free extract 22.59, crude fiber 18.21, and ash 6.21 per cent.

On Perilla cake and Mowrah meal. F. HONCAMP, M. REICH, and H. ZIMMERMAN (*Landw. Vers. Stat.*, 78 (1912), No. 5-6, pp. 321-347, pls. 4).—Analyses of Perilla cake are reported as water 12.3, protein 36.31, fat 7.05, nitrogen-free extract 19.74, crude fiber 16.28, and ash 8.32 per cent. In sheep-feeding experiments for a period of 10 days, in which meadow hay and Perilla cake were fed and complete digestibility tests made, it was estimated that the digestible nutrients in Perilla cake were protein 38.02, fat 7.05, nitrogen-free extract 19.96, and crude fiber 1.3 per cent.

Analyses were also made of 3 grades of Mowrah meal, one of them showing the following composition: Water 14, protein 17.12, fat 2.17, nitrogen-free extract 53.55, crude fiber 5.62, and ash 7.54 per cent. Mowrah meal is used as a filler in feeds for domestic animals, especially molasses feeds and similar products. The presence of saponin in Mowrah meal and its resulting toxic effect upon animals being fed the meal is noted.

[Results of the examination of stock feeds], W. D. SAUNDERS (*Ann. Rpt. Dairy and Food Comr. Va.*, 4 (1911-12), pp. 67-99).—Results are given of the examination of stock feeds, misbranded, adulterated, or otherwise illegal.

Feeding stuffs (*Ber. Grossh. Bad. Landw. Vers. Anst. Augustenb.*, 1912, pp. 18-35).—Analyses are given of the pressed cake and meal of the following materials: Peanut, coconut, linseed, corn, poppy seed, palm nut, rape seed, sesame, soy bean, and sunflower seed.

Fresh meat supply of western Norway, R. M. RASMUSEN (*Daily Cons. and Trade Rpts. [U. S.]*, 16 (1913), No. 273, p. 953).—It is reported that the market for fresh meat is growing rapidly, owing to the industrial expansion, and that due to the high prices prevalent for the past few years stock raising is being revived. The natural conditions about Bergen are deemed unexcelled for stock raising, especially sheep.

Annual meeting of the Cattle Raisers' Association of Texas (*Cattle Raisers Assoc. Tex. Proc.*, 37 (1913), pp. 163).—A compilation of addresses and discussions relating to the cattle industry of Texas, and including the by-laws, rules and regulations, and list of members of the Cattle Raisers' Association of Texas.

A comparison of the observed and computed heat production of cattle, H. P. ARMSBY (*Jour. Amer. Chem. Soc.*, 35 (1913), No. 11, pp. 1794-1800).—Calorimetric investigations were made upon herbivorous animals, and in particular upon ruminants, to determine the difference between the actual and computed heat production. Previous experiments with carnivora and man had shown a close agreement, but it was thought that the physiological differences in the digestive operations of the ruminant might introduce factors tending to alter these calculations. Observations made during 8 years, 1902 to 1909, inclusive, embracing 57 experiments covering 48 hours each, are reported.

The results of these investigations show an average difference in the observed and computed heat production of cattle of +0.4 per cent, which corresponds very closely to results of previous investigations. It is concluded that "the same equivalencies between chemical energy, heat energy, and mechanical energy obtain in the bodies of herbivorous animals as in those of carnivora or of man, and, as a rule, elsewhere in nature."

Studies of the endogenous metabolism of the pig as modified by various factors, E. V. MCCOLLUM and D. R. HOAGLAND (*Jour. Biol. Chem.*, 16 (1913), No. 2, pp. 229-325).—This article is discussed under 3 headings, as follows:

I. *The effects of acid and basic salts, and of free mineral acids on the endogenous metabolism* (pp. 229-315).—In these experiments young pigs were brought to their lowest level of nitrogen elimination through several weeks of starch feeding. Daily analyses were made of samples of urine for the total creatinin, creatin, ammonia, and urea nitrogen. The author's conclusions are summarized as follows: "The endogenous metabolism of the pig reaches its lowest level when the animal has an abundant supply of carbohydrates together with a salt mixture of an alkaline character. The total output of nitrogen derived from endogenous sources can be greatly increased without changing the output of creatinin. The additional nitrogen which is eliminated on an acid over what appears on an alkaline diet is in the form of ammonia. The animal is not able to use the nitrogen of the urea fraction to neutralize the acids present in the diet, but draws additional nitrogen from the tissues for ammonia production."

II. *The influence of fat feeding on endogenous nitrogen metabolism* (pp. 317-320).—"Feeding fat as the sole source of energy does not lead to a sustained rise in the nitrogen output of pigs which have been reduced to their

lowest possible level of nitrogen metabolism by long continued starch feeding. Fat feeding may produce a considerable elimination of creatin. The total creatinin (creatinin+creatin) may be greatly increased without a corresponding rise in the total nitrogen output. The possibility of the acid or basic character of the ration having an influence on the creatin production is suggested."

III. *The influence of benzoic acid on the endogenous nitrogen metabolism* (pp. 321-325).—"A considerable amount of the nitrogen which appears in the form of urea in pigs reduced to the endogenous level of protein metabolism may be converted into glycocoll when benzoic acid is fed for the purpose of hippuric acid synthesis. When the quantity of benzoic acid ingested is not excessive, there is no noticeable rise in the total nitrogen excreted over that which is eliminated on the same diet without benzoic acid.

"When the quantity of benzoic acid ingested is very large, there is a marked increase in the output of total nitrogen catabolized. The urea nitrogen can not be reduced to a lower level than about 20 per cent of the total. No change in the creatinin output is observed when the protein catabolism is stimulated by excessive doses of benzoic acid. Endogenous protein metabolism appears to consist of at least 2 types. One can be stimulated greatly for ammonia production by the introduction of mineral acids, or for hippuric acid when benzoic acid is introduced; the other, measured by creatinin, remains unaffected by the methods we have described."

Value of potatoes as the basal feed for swine, F. LEHMANN (*Jour. Landw.*, 61 (1915), No. 3, pp. 361-397, pls. 2).—Four lots of 12 weeks' old pigs weighing approximately 20 kg. each were fed during a period of 22 weeks a basal ration of grain feed, fish meal, and chalk. In addition, lot 1 received during the period approximately 171 kg. of corn; lot 2, 671 kg. potatoes; lot 3, 717 kg. potatoes and 4.73 kg. rye chaff fed during the first 8 weeks of the experiment; and lot 4, 63 kg. potatoes, 36.5 kg. rye chaff, and 8.8 kg. meat meal, the meat meal being fed during the last 14 weeks of feeding.

The average daily gain per pig of lot 1 was 0.552 kg. (12 lbs.), with a total net profit at the close of the experiment of 10.68 marks (\$2.54); lot 2, 0.496 kg., net profit 6.91 marks; lot 3, 0.553 kg., net profit 14.11 marks; and lot 4, 0.553 kg., net profit 14.84 marks. From this it is concluded that a basal ration of potatoes supplemented with prepared feeds and balanced with a protein feed as meat meal is profitable.

The electro-cardiogram of the horse, J. NÖRA (*Ztschr. Biol.*, 61 (1915), No. 4-5, pp. 197-229, pl. 1, figs. 45).—This is a description of a specially prepared apparatus which when in contact with various parts of the body of the horse registers graphically the comparative duration and intensity of the heart's movements. There are included charts showing the heart action of the horse as determined by a number of trials.

On the variations in the growth of the exterior of the grade horse of East Prussia, W. VÖLTZ (*Landw. Jahrb.*, 44 (1915), No. 3, pp. 493-496, pl. 1, figs. 2).—Measurements and comparisons were made of the various bones of the limbs, head, breast, back, and general exterior of foals at one-half, 1½, and 2½ years of age, and the relative growth during these ages determined. Complete tabular data are given showing the measurements and percentages of growth at these ages.

Heredity studies in the royal stud at Trakehnen, B. SCHMIDT (*Arch. Deut. Gesell. Züchtungsk.*, 1915, No. 16, pp. X+363+XVI, pls. 22).—Parts 1 and 2 of this volume treat in detail of the improvement of some of the permanent Trakehnen stud strains by various methods of inbreeding. Part 3 deals with

the problem of the heredity of color, with a discussion of the Bunsow, Struwe, Crampe, and Walther theories on color inheritance and of the relation of these to the principles of Mendellian inheritance. Part 4 treats of hereditary diseases, including periodic ophthalmia, cribbing, roaring, and foal lameness.

The author's observations led to the conclusion that a pathologic fold of the eyelids is hereditary, especially in the maternal line. Periodic ophthalmia was found to be hereditary in some cases, and not in others. Roaring was proved to be hereditary. Spavin, navicular disease, and broken windedness were not transmitted; however, it is thought that the first 2 diseases can be transmitted by animals that are much affected by them.

Breeding and raising horses for the United States Army, M. F. DE BARNEVILLE (*Jour. U. S. Cavalry Assoc.*, 24 (1913), No. 99, pp. 411-415).—A general account of the horse-breeding and training operations in use at the Front Royal Remount Depot, Va., and at other remount depots.

How to buy a horse, C. W. GAY and D. S. MILLER (*Penn. Live Stock Sanit. Bd. Circ.* 24, pp. 9).—This circular briefly treats of the general principles to be observed in selecting and buying a horse.

The Shetland pony, C. and ANNE DOUGLAS (*Edinburgh and London*, 1913, pp. XI-176, pls. 25).—A very complete volume treating of the early history of the Shetland pony, present day types, and the care and management of this breed. There is appended a detailed account, by J. C. Ewart, of the physiological changes incident to the origin and development of ponies in general and this breed in particular.

The Grevy zebra as a domestic animal, G. M. ROMMEL (*Amer. Breeders Mag.*, 4 (1913), No. 3, pp. 129-139, figs. 5).—This is an account of the attempts to cross the Grevy zebra on the common mare. In one case there was a marked aversion on the part of the zebra, although no difficulty was experienced in mating with a jennet. In another case there was less antipathy on the part of the male zebra, but no mating resulted. Finally a number of mares were artificially bred, with one live foal resulting.

It was found that zebra semen does not contain relatively so many spermatozoa as does that of the stallion, and this is thought to account in part for the difficulty encountered in breeding by artificial means. It is noted that the ass hybrids have no value as work animals, being decidedly donkey-like in disposition and habits. The mare hybrid is more like a horse in appearance and manners.

The author calls attention to the fact that the Grevy zebra is characterized by its extreme quality or finish, which, if imparted in mule production would offset any coarseness in the mares. It is susceptible to domestication and it is thought that the size may be increased by feed and selection. With regard to the effect of so-called telegony, or the influence of prior impregnation, it was found that the mare which produced the zebra hybrid and afterwards was bred to a Morgan stallion, produced a foal showing no evidences of the zebra impregnation.

Contrary to the usual manner of ass-mare hybrids, the zebra-ass hybrids, both male and female, show sexual activity. They have been bred together, but without results. Evidently the relationship between the zebra and common ass is closer than that between the ass and horse. It is thought that the Grevy zebra would prove of value as a farm animal, if properly handled.

The call of the hen, or the science of the selection and breeding of poultry, W. HOGAN (*Petaluma, Cal.*, 1913, pp. 126, figs. 56).—The author outlines a method for ascertaining the value of a hen by the relative thickness of and distance apart of the pelvic bones. Tests for the determination of capacity, condition, stamina, prepotency, and laying ability are described.

The Campine history, B. A. GATES (*Franklinville, N. Y., 1913*, pp. 46, *figs.* 19).—This publication deals with the origin, distribution, development, feeding, care, management, and utility value of this breed of chickens.

[Second international egg-laying contest], J. O. HOWE (*Amer. Cult.*, 75 (1913), No. 46, p. 11, *figs.* 2).—In this contest, held at the Connecticut Agricultural College, a White Leghorn broke the international record for egg production in a year by laying 282 eggs. The best pen of 5 laid 1,380 eggs.

Preservation of eggs by refrigeration in sterile air, M. F. LISCARDE (*Refrigerating World*, 46 (1913), No. 5, p. 45).—This is a description of an egg preserving method whereby eggs are subjected to a mixture of carbon dioxide and nitrogen in an autoclave, and the cases of eggs taken out, hermetically sealed, and stored in cold storage rooms at a temperature varying between 33.8 and 35.6° F. By this method it is claimed that the waste of eggs is eliminated, the eggs retain a "fresh" flavor and their full weight, and remain in good condition longer after removal from cold storage. The cost of treatment and preservation, including all depreciation, is estimated to be 3.44 cts. per dozen.

German oyster culture, T. J. ALBERT (*Daily Cons. and Trade Rpts.* [U. S.], 16 (1913), No. 178, p. 637).—An account of a German oyster fishery comprising about 5,000 acres. It is stated that by careful cultivation it has been possible to produce oysters equal in flavor to any foreign variety. The methods of culture, feeding, and production for market purposes are explained.

DAIRY FARMING—DAIRYING.

Modern dairy guide to greater profits, M. H. MEYER (*Madison, Wis., 1913*, pp. 88, *figs.* 10).—A general treatise on modern dairy and creamery practice.

Dairying and butter making on small farms, M. A. O'CALLAGHAN (*Dept. Agr. N. S. Wales, Farmers' Bul.* 65, pp. 13, *figs.* 3).—This publication gives general instructions on the selection of dairy cattle, and on the feed, care, and management of dairy animals. The health of the herd is considered, together with methods of caring for milk and cream and farm butter making.

Correlation between form and function in the dairy cow, H. M. KROON and C. J. RAB (*Tijdschr. Veeartsenijk.*, 33 (1911), No. 21, pp. 739-821).—Comparisons were made of the milk and milk-fat records of 100 Holstein cows in an effort to determine the correlation between these records and the body characteristics of the animals. The cows were grouped into 10 classes, according to milk yield (2,000 to 7,000 kg.) and milk-fat record (80 to 240 kg.), with a resulting classification giving the number of cows in each class as follows: As to milk yield, 5, 5, 16, 17, 22, 22, 8, 3, 1, 1; as to butter-fat yield, 9, 15, 17, 17, 23, 12, 5, 1, 1, 0. A close correlation between the milk yield and butter-fat record is thus noted.

Comparisons were then made of the body form and the number of animals of all classes for both milk and fat yield found under each body characteristic. In this case also the number of animals of each class for both milk and fat yield corresponded very closely. The body characteristics noted were length of head, breadth of forehead, shape of poll, thickness of horn at base, color and quality of horn, length of horn, quality of ear, hair growth on the head and poll, size of nose and mouth, color of nostril, and other similar points usually indicative of productive capacity.

There is appended a bibliography of 27 titles.

Red Polls for dairying, S. S. CAMERON (*Jour. Dept. Agr. Victoria*, 11 (1913), No. 9, pp. 564-569, *figs.* 7).—In this article the author reviews the successful work of the station herd of Red Poll cattle during 3 seasons. Milk-fat tests

ranged from 3.8 per cent to over 8 per cent, the average being approximately 4.5 per cent. The average milk-fat production per cow for each of the 3 seasons was, 255.77, 304.6, and 236.49 lbs., respectively.

It is stated that the crossing of these Red Poll cattle on native grade material produces the polled characteristics and an improvement in dairy qualities.

The new champion cow (*Milk Dealer*, 3 (1913), No. 1, p. 7).—An account of the Jersey cow, Eminent Bess, which now holds the world's record for performance for that breed, with a year's production of over 13,732 lbs. of milk and 963 lbs. milk fat. The record was made under the supervision of the Michigan Experiment Station.

Experiments with the milking machine, N. O. HOFMAN-BANG ET AL. (*Ber. K. Vet. og Landbohøjskoles Lab. Landøkonom. Forsøg* [Copenhagen], 81 (1913), pp. 43, figs. 5).—It was demonstrated that the use of the milking machine was entirely practicable, and except in the case of cows with sore or cracked teats, or poorly placed teats, the results obtained were practically equal to hand milking. The machine milking did not appear to have any influence on the fat content of the milk.

The report also describes trials with a milk cooler conducted during the year 1912-13.

Action of a pituitary solution as the active principle in milk secretion, B. A. HOUSSEY, L. GIUSTI, and C. MAAO (*Rev. Mens. Câm. Merc.*, 13 (1913), No. 125, pp. 58-68).—This article outlines experiments in which a pituitary solution was injected into the blood stream of female animals with a view to determining the effect upon the milk secretion. The results corroborated those of Schäfer and Mackenzie (*L. S. R.*, 25, p. 680) and in general indicated a temporarily increased yield as the result of the injection of this solution.

Increase in the specific weight of freshly drawn milk, W. FLEISCHMANN and G. WIEGNER (*Jour. Landw.*, 61 (1913), No. 3, pp. 283-323).—Tests were conducted to determine the causes for the increase in the specific gravity or so-called "thickening" of milk, which takes place in the first few hours after milking and at temperatures under the melting point of milk fat. Investigations were made into the influence of the retention of absorbed gases on the specific gravity of milk, on the changes in the constitution of the milk sugars, on the consistency of the fat globules, and on the influence due to the so-called rise of casein. These explanations for the rise in specific gravity of freshly drawn milk were found to be unsatisfactory, and it was concluded that this phenomenon was due to the progressive coagulation of the milk fat, which is liquid at the time of milking.

Thickening did not occur when the milk was prevented from cooling at temperatures at which fat can coagulate, nor did it take place in separated milk in which the fat content was low. An increase in specific gravity was obtained under the requisite conditions with emulsions made from milk fat and water, while the phenomenon was not noticed with emulsions of oils which remain liquid at the temperatures in question. The increase in specific gravity of freshly drawn milk begins with the cooling under the melting point of the milk fats and lasts from 4 to 6 hours. Thereafter the specific gravity is constant at all temperatures.

The variation in the volatile fatty acids content of milk fat during the lactation period of 4 cows of the Royal Domain of Kleinhof-Tapiau, C. W. BEERBOHM (*Die Schwankungen im Gehalte des Butterfettes an flüchtigen Fettsäuren während der Laktation von 4 Kühen der Kgl. Domäne Kleinhof-Tapiau. Inaug. Diss., Univ. Königsberg, 1913, pp. 65, figs. 2*).—In these investigations it was found that the colostrum fat of the first milking had a very low content of water-soluble and insoluble volatile fatty acids. Both the period of lactation

and the feed had a distinct influence on the composition of the fats. There was an increase in the volatile water-insoluble fatty acids of the milk fat during almost the entire lactation period, and an increase in all of the volatile fatty acids during the spring and summer months when the cows were receiving pasture and green feed. The feeding of beets favored the formation of the volatile water-soluble and insoluble fatty acids.

Weather conditions had no appreciable influence on the character of the milk fat, but the individuality of the cow was found to be an important factor. The period of heat of the cow had the greatest effect on the diminution of the volatile soluble and insoluble fatty acids. A sudden change of feed effected an important change in the composition of the fats, noticeable only after several days of feeding.

With several of the cows there was an increase in the volatile water-soluble acids during the beginning of the lactation period, and a decrease with all the cows during the fall months. There was a larger amount of water-insoluble volatile fatty acids during winter feeding, and the smallest amount during the first few months of freshening. The insoluble volatile fatty acids in the fat in one case, however, was lower in the morning during the fall months and higher in the evening. Sickness of the cows produced a slight fall in the Reichert-Meissl and Polenske numbers. The highest value of the refraction exponent was in the fall months, and the lowest toward the end of the lactation period.

The maximum fall in the saponification number occurred during winter feeding, the minimum at the beginning of the lactation period. The highest Reichert-Meissl number was 32.44, the lowest 13.58; the highest Polenske number 4.89, the lowest 0.99; the highest Köttsdorfer number 212.4, the lowest 213.1. The highest refraction exponent was 48.2, the lowest 40.7. There was found to be a correlation between the refraction exponent and the other 3 factors.

On the milk fat of late milking cows, K. von Fenger (*Ztschr. Untersuch. Nahr. u. Genussm.*, 26 (1913), No. 5, pp. 235-237).—Comparing the milk fat of fresh cows and of those well along in lactation it was found at the experiment station for dairying at Magyar Ovar that the Reichert-Meissl numbers and saponification numbers were higher with the former than in the case of the latter, while the iodine test and refractive index were lower with the fat from the fresh cows.

First annual report of the International Association of Dairy and Milk Inspectors (*Ann. Rpt. Internat. Assoc. Dairy and Milk Insp.*, 1 (1912), pp. 131, fig. 1).—A compilation of papers and addresses delivered at this convention. It deals principally with the methods of inspection employed by the various city inspectors, but also includes papers on bovine tuberculosis eradication, economic milk production, and milk inspection from the standpoints of the producer and the milk dealer.

[Report on milk standards] (*Cream and Milk Plant Mo.*, 2 (1913), No. 1, pp. 1-11, fig. 1).—This is the second report of the commission on milk standards and adopted by the American Public Health Association.

With respect to pasteurization it is recommended "that pasteurization of milk should be between the limits of 140° and 155° F. At 140° the minimum exposure should be 20 minutes. For every degree above 140° the time may be reduced by one minute. In no case should the exposure be for less than 5 minutes. . . . Pasteurization in bulk, when properly carried out, has proved satisfactory, but pasteurization in the final container is preferable." It is further urged that retail milk be labeled and marked, giving the grade of the milk and the date of production or of pasteurization.

The committee prescribes methods for bacteria count and the grading of milk accordingly. Definitions of the proposed grades of milk and cream are

given and provisions are made for the sale of homogenized and adjusted milks. It is advised that all milk be sold either under personal guaranty or under the regular state guaranty. Suggested standard rules for the production, handling, and distribution of both raw and pasteurized milk are appended.

Examination of Moscow market milk, A. WOJTKIEWICZ (*Centbl. Bakt. [etc.]*, 2. Abt., 39 (1913), No. 1-3, pp. 53-61).—A comparison is reported of the bacteria count, specific gravity, fat content, and general condition of the different grades of wholesale and retail milk in Moscow for the fall, winter, spring, and summer seasons, and of the relative percentage of sour milk bacilli, coli group, and gelatin-liquefying bacilli present during these seasons.

Methods of examination of clarifier milk slime, C. E. NORTH (*Abstr. in Cream and Milk Plant Mo.*, 2 (1913), No. 1, p. 19).—An examination was made of the slime resulting from the clarifying of milk.

Slime was invariably found in all milks, including certified. The amount of slime for individual cows ranged from 1.06 per cent to 1.14 per cent, and traces of slime were found in the milk even after the third and fourth clarification.

An analysis of this slime showed a total solids content of 30 per cent, of which 3 per cent was fat, 3 per cent ash, and the remaining 24 per cent nitrogenous organic compounds. Casein could not be found, and an occasional trace of blood was ascribed to the presence of pus. Purin, indicating the presence of cellular substances, was quite noticeable in fresh slime and decreased with the age of the slime. The presence of cellular elements, detected by microscopical examination, was ascribed to tissue cells and not pus cells. However, this point is under dispute. Occasional phagocytosis was noted. Mastitis milk frequently showed ten times the amount of slime that is found in normal milk.

Large numbers of bacteria were found in the clarifier slime, although there was no reduction in the bacterial count of the clarified milk. It is believed that in the process of clarifying, the clumps of bacteria are broken up by the force of the centrifuge, and that although a large number remain in the slime, the number of colonies is not materially lessened in the milk. In the belief that if the colonies were broken up by clarifying a subsequent pasteurization would be facilitated, experiments were made accordingly, but the results were disappointing.

In a discussion it is pointed out that leucocytes are always phagocytic, also that blood may be present in milk from herds not infected with any kind of disease. The presence of these bodies does not, therefore, necessarily denote the presence of pus cells.

Sampling for Babcock test, J. O. HALVERSON (*N. Y. Produce Rev. and Amer. Cream.*, 36 (1913), No. 21, p. 874).—Investigations were made to determine the factors which influence the percentage of milk fat obtained in ice cream samples. It was found that there was a great variance in these percentages, due to (1) nonuniformity of the ice cream itself; (2) effect of testing charges taken at different times on ice cream samples which have stood, allowing the cream to rise to the top; and (3) method of mixing ice cream samples after having stood for some time.

On clean churning and related questions, L. F. ROSENGREN (*Meddel. Centralanst. Försöksv. Jordbruksområdet*, 1913, No. 77, pp. 24, figs. 4; *K. Landtbr. Akad. Handl. och Tidskr.*, 52 (1913), No. 4, pp. 254-275, figs. 4).—A study of the factors that influence the degree of the complete recovery of butter fat in churning cream in which the results of churning experiments with creams of similar fat contents at different churning temperatures, with cream of varying fat contents, and with churns filled with varying amounts of cream are pre-

sented. Trials with ice and artificial freezing mixtures in churning cream are also reported.

Brine salting cheese, J. H. MONRAD (*N. Y. Produce Rev. and Amer. Cream.*, 36 (1913), No. 18, pp. 754, 755).—The advantages claimed for this method are as follows:

"First of all it must be said that brine salting saves the cheese maker a good deal of work. The cheese lies in the brine 3 days and requires no work. The brine-salted cheese is firmer and hence easier and safer to take care of. Cheeses which lie in the brine are also salted quicker than by the old dry salting system, all of which saves considerable labor in making Lombard cheese. Another advantage is a saving in salt. If the preparation of the brine and the maintenance of its strength is done in a rational manner, nearly half the salt is needed. The brine-salted cheese keeps its shape better than by dry salting on the outside, is easier to keep clean, and preserves a fresher and more attractive appearance. The brine salting does not delay the ripening, indeed it rather hastens it."

In making the brine pure water is used, saturated with 20 per cent pure kitchen salt and at a temperature of 59° F. This method was first used in making skim milk cheese but has since been applied to the making of Lombard cheese.

Home cheese making without apparatus, A. COXTON (*Agr. Gaz. Tasmania*, 21 (1913), No. 6, pp. 208-212).—Directions are given for the making of home-made cheese.

Fresh cream cheese, A. RORER (*Vic Agr. et Rurale*, 1913, No. 36, pp. 256-258, fig. 1).—A detailed explanation of the French method of making fresh cream cheese.

The manufacture of Grana cheese with a select ferment C. COXTON (*Agr. Mod. [Milan]*, 19 (1913), No. 13, pp. 147, 148, figs. 3).—Comparisons are made of the results obtained in the use of ordinary culture and a select ferment in the making of Grana cheese. It was demonstrated that with a select ferment the product is superior in consistency, taste, odor, and general condition.

On the abnormal ripening of Liptauer cheese, K. von FABOK (*Ztschr. Unter-such. Nahr. u. Genussmit.*, 26 (1913), No. 5, pp. 225-234, fig. 1).—In this article the author summarizes the results of tests made to determine the chemical and physical changes undergone in the ripening process of Liptauer cheese.

Reindeer milk and cheese, C. BARTHEL and A. M. BRAZMAN (*Ztschr. Unter-such. Nahr. u. Genussmit.*, 26 (1913), No. 5, pp. 238-241, figs. 2).—Four analyses were made of reindeer milk, the average composition being water 62.3, protein 10.3, fat 22.46, milk sugar 2.5, and ash 1.44 per cent. Reindeer cheese has a white color, a mild taste, and melts in the mouth. The rind has a sharp taste, but the inner portion has the characteristic delicate aroma of reindeer. The composition of the cheese is given as water 28.81, protein 22.57, fat 41.02, other organic matter 2.2, and ash 2.4 per cent.

The creamery industry: By-products and residues, A. RORER (*L'Industrie Laitière: Sous-Produits et Résidus*, Paris, 1905, pp. VII+397, figs. 162).—This volume treats very completely on all phases of creamery practice, dealing largely with the mechanical devices in common use, and treating of the manufacture of by-products such as fermented milk drinks and foods, condensed milk, and milk powder. The manufacture of a number of varieties of cheese is fully considered. Directions are given for determining the acidity and density of milk, and the extraction of milk sugar and the manufacture of alcohol and other products from waste milk are taken up in detail.

Experimental researches on the bacteriological and intoxicating character of the lactic acid food, "Gioddu," of Sardinia, G. ROSINI (*Mod. Zootro, Parte Sci.*, 1913, No. 3, pp. 87-100).—An account of the Italian lactic acid drink, "Gioddu," corresponding to yoghourt, koumiss, and kefir, and for which is claimed the property of antagonism to the pathogenic micro-organisms of the intestines.

VETERINARY MEDICINE.

Regional anatomy of domestic animals, L. MONTANÉ and E. BOURDEVILLE (*Anatomie Régional des Animaux Domestiques*. Paris, 1913, pp. 1069; rev. in *Rec. Méd. Vét.*, 90 (1913), No. 5, pp. 195-199).—This is a new work intended for both the student of veterinary medicine and the practitioner.

Meat hygiene, T. E. MUNCE (*Penn. Live Stock Sanit. Bd. Circ.* 26, 1913, pp. 48, pls. 3, figs. 13).—This reports upon the abattoirs and meat inspection work in the larger municipalities of Great Britain, France, Germany, and Netherlands. A plan for either a private or municipal slaughterhouse is included. •

Principles of milk hygiene for veterinarians, W. EHNST (*Grundriss der Milchhygiene für Tierärzte*. Stuttgart, 1913, pp. VIII+301, pls. 5, figs. 26).—This is the first edition of this work, which seems to have many features that are different from other works previously published on milk hygiene. Its contents are as follows: Anatomy, pathology, and the finer structure of the mammary gland; physiology of milk secretion and properties of milk in general; microscopy of milk; composition of milk and its biological, chemical, and physical properties; the production of cow's milk; internal and external causes affecting the composition of milk; bacteria in market milk and their origin and action upon milk; control of the milk supply; laws relating to the milk supply; and the examination of milk.

The book is illustrated with many plates and drawings.

Müller's serodiagnostics methods, P. T. MÜLLER, trans. by C. R. WHITMAN (*Philadelphia and London*, 1913, 3. ed., pp. XIII+146, figs. 7).—A clear, concise description of the methods used in serodiagnostics, with especial reference to human medicine, translated from the third German edition.

On the mechanism of complement fixation, H. R. DEAN (*Jour. Hyg. [Cambridge]*, 12 (1912), No. 3, pp. 259-289; abs. in *Ztschr. Immunitätsf. u. Expt. Ther.*, 11, Ref., 6 (1913), No. 15, p. 1118).—The author finds that by making a series of dilutions with antisera, it is possible to determine the point where a definite amount of antigen will combine with the complement. In the absence of the latter it will give no precipitate, but if complement is added, a precipitate appears after several hours. By adding more complement a limited increase in the precipitate is noted.

Instead of using complement the same results can be obtained with the euglobulin prepared from guinea-pig serum. The precipitation of euglobulin is practically the same as that produced by carbon dioxide. The middle portion is fixed much quicker by the precipitation of an antigen-antiserum mixture than the end portion. The results show that the fixation of the constituents of complement is similar to the fixation which occurs with inorganic substances, e. g., barium sulphate suspensions, and that adsorption plays an apparent rôle in complement fixation.

Meiostagmin reaction and pregnancy, A. FULCHIEBO (*Biochim. e Terap. Sper.*, 4 (1912), No. 3, pp. 58-61; abs. in *Ztschr. Immunitätsf. u. Expt. Ther.*, 11, Ref., 6 (1913), No. 15, p. 1056).—In the experiments 35 sera from pregnant women and 35 control sera were examined with the meiostagmin reaction, 3 different kinds of methyl alcohol extracts being employed. All of the

sera from the pregnant women showed high values, but certain neoplastic sera gave increased figures also.

Glycosuria and allied conditions. P. J. CAMMIDGE (*London, 1913, pp. VII + 487, figs. 2*).—This book, while dealing particularly with glycosuria, diabetes insipidus, etc., as they occur in man, is especially valuable for veterinarians interested in diseases of metabolism. It deals with the classification, properties, and physiology of the carbohydrates and their derivatives; the detection and differentiation of sugars and other reducing substances in the urine; the determination of the sugars, acetone bodies, nitrogen, etc., in the urine; experimental glycosuria; alimentary, transitory, and intermittent glycosuria; persistent glycosuria—urinary changes, blood and clinical symptoms, pathology and diagnosis, metabolism, treatment and prognosis; levulosuria, maltosuria, the occurrence of isomaltose, lalose, heptose, palidose, glycogen, animal gum, and inosit in the urine; lactosuria, galactosuria, saccharosuria, pentosuria, and the occurrence of glucuronic acid in the urine; alkaptonuria, diabetes insipidus, and the chemical properties and reactions of the carbohydrates and related substances. Many bibliographical references are appended.

Experimental studies in glycosuria immunity. E. LANZAGNI (*Riv. Clin. Pediatr., 10 (1912), No. 3, pp. 185-203; abs. in Ztschr. Immunitatst., u. Expt. Ther., II, Ref., 6 (1913), No. 15, p. 1937*).—By treating a sheep subcutaneously with slowly increasing doses of glucose, it was possible later to give the animal a large amount of glucose without having it appear in the urine. A glucose-splitting ferment is elaborated in the system but the immunity produced is not permanent. The same findings were noted in a goat receiving saccharose but some of the enzymes produced in the blood were noted in the milk.

On the distribution of potassium in renal cells. C. L. BROWN (*Trans. Canad. Inst., 9 (1912), III, No. 22, pp. 389-407, pls. 2*).—"The sodium cobalt hexanitrite reagent ($\text{CoNa}_2(\text{NO}_3)_6 + n\text{H}_2\text{O}$), as prepared by Professor Macdonald, is a suitable reagent for the localization of potassium in kidney tissue. It is essential that the tissue be frozen while perfectly fresh, and that the sections prepared from it be kept frozen until they come in contact with the reagent. There is a definite localization of potassium on the external surface of the convoluted tubules and frequently about their lumina as well. The uniformity of this localization about the tubules tends to increase in direct proportion to the state of activity of the kidney. In the resting condition or during ordinary activity the only potassium demonstrable in the cytoplasm of the cells of the convoluted tubules is condensed in a layer immediately adjacent to the lumen border in each cell. This localization appears to be in accordance with surface tension phenomena.

"The presence of potassium in the lumina of the tubules and absence of potassium in the glomerular cavity is evidence that the inorganic salts are excreted by the tubule cells. No evidence bearing on the manner in which the glomeruli perform their function was obtained. In no instance was any potassium found in a cell nucleus. The amount of potassium in the kidney of the dog and even of the frog exceeds that of the sodium, and in the dog it exceeds greatly the amount of potassium in the blood or plasma."

The toxicity of gentian violet and its fate in the animal body. J. W. CAUSCHMAN and L. F. HERZ (*Jour. Expt. Med., 18 (1913), No. 5, pp. 579-583, pls. 2*).—Observations of the bactericidal properties possessed by gentian violet, and particularly of its affinity for prozoic organisms, led the authors to attempt to determine the toxicity of this substance and its fate in the animal body. They here report upon a series of some 75 experiments made on dogs and rabbits.

Rabbits which received enormous doses (10 cc. of 1:200 solution) remained alive and were still perfectly well a number of months after the experiment. In another group of experiments, however, the animals died within a minute or so after injection. These experiments showed conclusively that blood withdrawn from animals thus injected possesses the selective bactericidal power of the dye, but that this power disappears completely in about 2 hours. There is no similar loss of selective bactericidal power when the dye is simply allowed to remain in contact with blood in vitro. Intravenous injection of gentian violet was found to result in prompt and fairly deep staining of the visible mucous membranes, and also appears in the mucous membranes lining the gastro-intestinal tract. The visible membranes remained stained about 48 hours, the stain disappearing slowly during this time.

The fate of the dye in other organs has not been determined. Frozen sections of tongues of dogs and rabbits painted with strong solutions of the dye showed that penetration had occurred through the thickness of the mucosa down to the muscularis.

Experiments on the cultivation of so-called trachoma bodies, H. NOGUCHI and M. COHEN (*Jour. Expt. Med.*, 18 (1913), No. 5, pp. 572-578, pl. 1).—"An organism was isolated and studied in pure cultures from cases of conjunctivitis accompanied by the so-called trachoma body inclusions, as well as from a case of old trachoma without inclusions. This organism was not found in the cultures made from other forms of conjunctivitis in which the inclusions were absent. The organism presents the morphological features characteristic of so-called trachoma bodies. It undergoes an early transformation, during which the forms known as initial bodies appear, and a later change, during which forms resembling elementary granules arise, while certain intermediate forms between these occur simultaneously. No definite cell inclusions could be produced in monkeys by inoculating pure cultures of the organism. The cultivation of this organism from a case of trachoma without the cell inclusions, together with the previously ascertained fact that the inclusions can be produced in suitable animals by inoculating such material directly from a human case, suggests the possibility of the organism being still present in such cases of trachoma, although not in the form of cell inclusions.

"The facts presented justify the statement that by a suitable method an organism resembling the various important stages of the trachoma bodies and totally distinct from the gonococcus has been obtained in a living condition capable of indefinite cultivation from cases of human trachoma and inclusion conjunctivitis. Whether the organism and trachoma bodies are identical can not be positively stated at present. But the way is now opened to determine this point, as well as the specificity of the trachoma bodies."

On the toxins of ascarids, H. DOBERNECKER (*Über Toxine der Ascariden. Inaug. Diss., Univ. Bern, 1912, pp. 57*).—In this paper the author first reviews the literature at length (pp. 3-15) and then reports his own investigations. He concludes that the ascarids contain toxins in their body fluid which in man act particularly on the brain and in animals on the spinal cord, as well as irritating the skin and mucous membranes; that male and female ascarids of the same genus are equally toxic; that the body fluid of *Ascaris megalocephala* is more toxic than that of *A. lumbricoides*; and that the toxic action of the body fluid of ascarids is destroyed by the gastric juice.

Verminous toxins: A review, WEINBERG (*Bul. Inst. Pasteur*, 10 (1912), Nos. 22, pp. 969-977; 23, pp. 1017-1026; 24, pp. 1065-1072).—This paper, presented at the First International Congress of Comparative Pathology, held at Paris in October, 1912, deals with the subject under the headings of (1) indirect evidence, including verminous eosinophilia, and the passage of verminous toxins

into the host; and (2) direct evidence, including hemotoxins, toxicity of the liquids of parasitic cysts, ascarid toxins, teniotoxins, and the bactericidal properties of helminths. A bibliography of 2 pages is appended.

Investigations of a nematode and its faculty of producing papillomatous and carcinomatous neoformations in the stomach of the rat, J. FRIGER (Overs. K. Danske Vidensk. Selsk. Forhandl., 1913, No. 1, pp. 47-87).—A hitherto unknown disease of the stomach and of the esophagus of the rat (*Mus decumanus*), endemic in a single limited locality, was found to be caused by an undescribed nematode of the genus *Spiroptera*. The adult nematode infests the epithelium of the stomach and esophagus.

The cockroaches *Periplaneta americana* and *P. orientalis* serve as intermediate hosts. The eggs of the nematode which pass out in the excrement of the rat are ingested by the cockroaches, develop, and the embryos become localized in the striated muscles of the prothorax and the legs. The rats become infested by eating cockroaches, and the embryos of the worm, set free from their cysts, attack the epithelium of the stomach, sometimes also that of the esophagus, tongue, and buccal cavity, and develop into the adult nematode. The author's investigations lead him to conclude that all the anatomical alterations are due to toxic products of the nematode.

From the primary lesions caused by the nematode secondary metastases may be produced in other organs; the metastases contain neither the parasites nor their eggs. The development of the metastases is due to the faculty of the epithelial cells of multiplying in other organs independently of the parasite. The author thus confirms the view put forward by Borrel and Haaland that nematodes may produce malignant tumors in rats and mice.

A contribution to the study of nematode parasites of the dog's eye, A. RAILLIER and A. HENRY (Bul. Soc. Cent. Méd. Vet., 99 (1913), No. 10, pp. 209-215, figs. 6).—Following a review of the reports of 3 observations by others of nematode parasites in the dog's eye, 2 relating to intra-ocular parasites and 1 to an extra-ocular parasite, the authors report on the occurrence of a fourth, a female *Hamostromylus rasorum*, in the anterior chamber of the eye of a dog at Laval, France.

Combating contagious abortion, HASENRAMP (Arch. Wiss. u. Prakt. Tierheilk., 39 (1913), No. 4-5, pp. 422-434, fig. 1).—A description of epizootics of contagious vaginal catarrh and contagious abortion which occurred in all of the districts of the Province of Westphalia.

The light acute cases of vaginal catarrh were treated successfully with Bengel's vaginal capsules, but the severe acute cases did not respond to this treatment despite the fact that it was continued for weeks and the stables were thoroughly disinfected. Bissulin also did no good. In 3 barns unsatisfactory results were obtained with Gaus' lymph.

As the tampon method seemed to present some favorable features, it was tried, and for preventing the tampon from being expelled, a special form of apparatus was constructed which the author calls the tampon holder or retainer. The tampons before insertion were impregnated with a 2 per cent lysolform or sapoform solution, and were kept in the vaginal cavity for 24 hours. In severe cases a new tampon was inserted for 12 hours longer. In about 5 days the lesions in the mucous membrane of the vaginal canal had been removed. The method was used in 1,000 cases and was applied by 8 veterinarians. It is deemed advisable after the disease has been removed to wash out the vaginal cavity with a 2 per cent solution of sodium bicarbonate, especially before the animal is served.

For combating contagious abortion in cows Schreiber's method (E. S. B., 28, p. 380) was used in 2 establishments, but found to be unsatisfactory,

although the animals received in addition a subcutaneous injection of 10 cc. of a 2 per cent carbolic-acid solution each week. Also the animals in 6 small herds were divided into 2 groups, one-half receiving Schreiber's lymph and the other half being treated by Bräuer's carbolic-acid method.* Bräuer's method gave the better results, and Schreiber's lymph is not a certain method for preventing abortion. See also the work of Taylor (E. S. R., 23, p. 781).

Peptotoxin production by the bacillus of contagious abortion of cattle, J. REICHEL and M. J. HARKINS (Centbl. Bakt. [etc.], I. Abt., Orig., 69 (1913), No. 3, pp. 142-163).—The *Bacillus abortus* was found to produce a toxin when cultivated on a medium containing peptone, but would not develop it on a non-peptonized medium. It was possible to remove the toxin from the bacilli by thoroughly washing with water. By adding alcohol to the supernatant fluid obtained from a suspension of bacilli grown on peptonized agar, a precipitate was obtained which contained the toxic substances. Heating the toxin for 30 minutes at 65° C. had apparently no effect on its toxic properties. It was found, however, that in order to make cattle react toward the toxin they must first be sensitized to it.

"*B. typhosus*, *B. coli communis*, *B. tetani*, and pneumococcus cultures on peptonized agar revealed the presence of peptotoxin when injected into animals sensitized to the *abortus* bacillus or its products. The peptotoxins of these organisms probably have much in common, if they are not one and the same substance, because animals can be sensitized with one for any of the others. No reactions were observed following the injections into sensitized animals of peptonized agar cultures of the diphtheria bacillus, *Staphylococcus pyogenes aureus*, nonhemolytic streptococcus, and hemolytic streptococcus, which may mean that the organisms did not produce peptotoxin or only in very small amounts.

"Rabbits developed agglutinins following the injection of thoroughly washed and unwashed *abortus* bacilli equally well. The peptotoxin injected with the unwashed bacilli is not essential in the production of antibodies. In that the *abortus* bacillus produces peptotoxin in a protein medium and it is a possibility that peptotoxin is produced in milk with the bacilli from cattle in infected herds, the wholesomeness of such milk is more questionable."

Certain individual differences were noted in the amounts of peptotoxin produced by various strains of the *B. abortus*, as noted by McFadyean et al. (E. S. R., 22, p. 584).

Hyperimmunization of horses for obtaining an antianthrax serum, I. G. EIGEN (Arch. Vet. Nauk. [St. Petersburg], 42 (1912), No. 7, pp. 637-646; abstr. in Centbl. Bakt. [etc.], I. Abt., Ref., 56 (1913), No. 12, p. 357).—The serum can be obtained in as short a time as 3 months providing the horses are treated daily with small doses of virulent anthrax bacilli.

Testing of Grugel's vaccine against foot-and-mouth disease, NEVERMANN (Berlin. Tierärztl. Wchnschr., 29 (1913), No. 30, pp. 537, 538).—In the experiments 13 cattle were used. Ten of these were treated with the vaccine and 3 were kept as controls. In no case did the vaccine prove of any value for protecting animals against foot-and-mouth disease.

Technique and practical significance of precipitation for the intravital and post-mortem diagnosis of glanders, J. LENFELD (Ztschr. Infektionskrankh. u. Hyg. Haustiere, 14 (1913), No. 1, pp. 68-90).—Precipitation is deemed an important aid for diagnosing the intravital presence of glanders. A systematic examination of blood resulted in establishing the presence of the disease in 100 per cent of the cases, while 1 examination of blood showed it to be present in

* Deut. Ztschr. Tiermed., 14 (1889), No. 1-2, pp. 95-101.

62 per cent, and when the test was made in combination with the ophthalmic reaction, 78 per cent of the cases were detected.

For the post-mortem detection of the disease the test will probably prove positive each time that the organs are utilized for making the extracts.

About the preparation of bacillary extracts for complement fixation, W. FREILER and G. WEBER (*Ztschr. Immunitätsf. u. Expt. Ther.*, 1, orig., 15 (1912), No. 2-3, pp. 180-185; *abs. in Centrbl. Bakt., [etc.], 1. Abt., Ref., 56 (1913), No. 12, p. 359*).—It was found that repeated shaking of the glanders bacillus suspensions in preparing extracts was unnecessary. It is sufficient simply to centrifuge the suspension and to utilize the uppermost clear fluid for the tests. Bacillary suspensions could be boiled without affecting their activity. An analogous finding was noted with the hog cholera bacillus and other micro-organisms.

Malta fever: Cases occurring in Arizona. C. E. YOUNT and R. N. LOONEY (*Ariz. Med. Jour.*, 1 (1913), No. 4, pp. 18-27; *abs. in Jour. Amer. Med. Assoc.*, 60 (1913), No. 22, p. 1740).—A description of 5 cases of malta fever in man, as previously noted (*E. S. R.*, 27, p. 841).

Malta fever in Louisiana. C. WILLMAN, A. ECKHIS, and S. S. SCHUCHET (*Amer. Jour. Trop. Diseases and Prev. Med.*, 1 (1913), No. 5, pp. 393-396, fig. 1).—The authors report upon a case of Malta fever in a man, detected at New Orleans by means of the agglutination tests, who evidently became infected in Jackson County, Texas.

Immunizing tests against rabies. H. MIESSNER, KILM, and KAPFERBERG (*Arch. Wiss. u. Prakt. Tierheilk.*, 59 (1913), No. 3, pp. 169-269; *abs. in Berlin. Tierärztl. Wchnschr.*, 29 (1913), No. 21, p. 386). The purpose of the work was to devise a method for immunizing domesticated animals against rabies. The various methods used for man are based on the principle that small doses of attenuated fixed virus are necessary to bring about immunity. In these experiments it was found that with 3 intravenous injections of fixed virus it was possible to produce an immunity, providing the control infection of the animal was allowed to follow some weeks later. The formation of immune bodies proceeds slowly. For the dog the intra-abdominal route is preferred. The curative treatment occupies a secondary position. It is advisable to immunize all animals (dogs) yearly.

The tests for preparing a highly potent immune serum for all classes of animals have not been completed. Tests with salvarsan against this disease were conducted but with negative results. The detection of Neri bodies in rabbits used for the transference (passage) experiments with fixed virus was successful in 80 per cent of the cases. The transference of virus from mother to fetus was also noted. Three animals (1 sheep and 2 rabbits) infected with street (passage) virus became rabid in 2 days. The aqueous and vitreous humor of rabid rabbits' eyes can produce typical rabies when injected into other rabbits.

New immunizing tests in rabies. W. FREILER (*Berlin. Tierärztl. Wchnschr.*, 29 (1913), Nos. 14, pp. 249-252; 15, pp. 269-273).—After giving a description of the research work which led up to the discovery of the antirabic vaccination and the details of the various modifications of Pasteur's method, attention is called to the value of immunizing domesticated animals against rabies. The number of tests thus far conducted is regarded as inadequate to properly judge the efficiency and practical utility of immunization.

The results of tests conducted at the Emperor William Institute of Agriculture at Bromberg by Mieessner, Kilm, and Kapferberger are discussed in the article. All animals, with the exception of those from which it was desired to obtain an immune serum, were immunized by the rapid method. Some of the tests seemed satisfactory while others were entirely discouraging.

The author has had under observation over 30 dogs which were completely immune and thoroughly refractory toward rabies. The animals received from 4 to 8 gm. of fixed virus intraperitoneally and these amounts were able to protect the animals against an infection with fixed or street virus which was given 14 days following the vaccination. Subcutaneous injections, when given as recommended by Ferran, always produced a strong inflammation of the subcutaneous tissue, consequently this method of injection was abandoned. A part of the animals were infected either subdurally several months later, or were bitten by a rabid animal, with the result that all of the animals remained sound. In another series of experiments manifestations of immunity were noted when immune serum was injected intravenously, subcutaneously, or intraperitoneally in animals, but when the serum was introduced into the spinal canal the animals (dogs and sheep) were absolutely protected. Probably a local immunity was concerned here. With this new intraspinal method 16 sheep, about 20 dogs, about 80 rabbits, and 1 horse were treated.

In regard to Miessner's report with reference to immunizing animals against rabies, W. PFEILER (Berlin, *Tierärztl. Wchnschr.*, 29 (1913), No. 30, pp. 549-543).—A polemic.

Immunizing dogs against rabies, W. PFEILER and G. KAPFERGER (*Ztschr. Infektionskrank. u. Hyg. Haustiere*, 13 (1913), No. 6, pp. 307-316).—This is a detailed statement of the results of an investigation, noted above, with experimental data.

In regard to immunizing against rabies, MIESSNER (Berlin, *Tierärztl. Wchnschr.*, 29 (1913), No. 31, p. 558).—A reply to the above.

Sporotrichosis of animals, DE BEUMANN and GOUGEOT (*Rev. Gén. Méd. Vét.*, 21 (1913), Nos. 250, pp. 557-586; 251, pp. 626-645, figs. 21).—This paper on the comparative pathology of sporotrichosis takes up the subject under the headings of spontaneous sporotrichosis of the rat, dog, mule, and horse; experimental sporotrichoses of animals; clinical diagnosis; and prognosis and treatment.

The trypanosomes causing dourine (mal de coït or Beschläuche), R. BLACKLOCK and W. YORKE (*Proc. Roy. Soc. [London]*, Ser. B, 87 (1913), No. B 593, pp. 89-96, pl. 1, figs. 3).—This is in continuation of work of which a preliminary account has been previously noted (E. S. R., 27, p. 884). The morphology of three strains of the trypanosome, supposedly *Trypanosoma equiperdum*, one originating in Algiers and the other two in Germany, was studied. The authors are led to conclude that the symptom-complex of the disease, clinically known as dourine, can be produced by more than one species of trypanosome. They were unable to distinguish morphologically the Algerian form from *T. rhodesiense*, *T. pecaudi*, *T. brucei*, and *T. uganda*.

Studies of the piroplasmoses occurring in Algeria (*Bul. Soc. Path. Exot.*, 6 (1913), Nos. 8, pp. 571-574; 9, pp. 618-623).—The first paper (pp. 571, 572), by E. Sergent, A. Lhèritier, and R. Ismert, relates to equine piroplasmosis in Algeria and its cure by trypanblue; the second paper (pp. 573, 574), by E. Sergent and M. Beguet, reports upon the occurrence of *Anaplasma marginale* in cattle in Algeria. An acute and very grave case of piroplasmosis in a horse was observed in a region from which the disease had not previously been reported but where bovine piroplasmosis is enzootic. This case rapidly recovered following the injection of trypanblue. A number of preparations of blood from cattle presenting symptoms of piroplasmosis were found to contain *A. marginale*. The third paper (pp. 618-622), by E. Sergent, A. Lhèritier, and A. Boquet, relates to the treatment of bovine piroplasmosis by trypanblue; the fourth paper (pp. 622, 623), by E. Sergent and A. Lhèritier, reports upon an intense piroplasma infection in apparently healthy cattle.

Tubercle bacilli in the circulating blood in surgical tuberculosis. M. KARBEL (*Deut. Ztschr. Chirurg.*, 120 (1913), No. 3-4, pp. 379-378; *abs. in Jour. Amer. Med. Assoc.*, 60 (1913), No. 9, p. 765).—Eighteen patients having surgical tuberculosis were examined for the presence of tubercle bacilli in the blood, and in 12 of the cases the organisms were found. Five subjects having tuberculous lymph nodes showed positive in one case, and positive results were obtained in 1 out of 4 cases having tuberculosis of the mucosa, skin, or tendon sheaths.

Report on the results of a chemical investigation [of the tubercle bacillus]. A. HARDEN (*Roy. Com. Tuberculosis, Final Rpt.*, pt. 2, 6 (1913), pp. 34).—This details the results of an investigation instituted at the request of the Royal Commission on Human and Animal Tuberculosis for the purpose of ascertaining whether it is possible by chemical means to differentiate between the human and bovine types of bacilli. The viruses employed were of bovine, porcine, and human origin.

Part 1 of the work deals with the changes produced by growing the bacilli in glycerol real broth. The determinations made after filtering off the bacterial growth, which was weighed, were total nitrogen, nitrogen nonprecipitable by tannic acid, nitrogen nonprecipitable by phosphotungstic acid, free and saline ammonia, ammonia liberated by hydrolysis with hydrochloric acid, acidity of the medium to phenolphthalein in the cold and at the boiling point, acids soluble in ether, and the amount of glycerol present.

From this part of the investigation it was concluded that "no definite physiological difference has been detected between tubercle bacilli of different origins. Such differences as exist between the amounts of action exerted on glycerol beef broth by different cultures are probably to be attributed to differences between the weights of organisms formed, the times of incubation, and individual characteristics of the strains. When *Bacillus tuberculosis* is cultivated on glycerol broth, the proteins of the broth undergo hydrolysis to a considerable extent. Glycerol is partially removed by oxidation. There is no evidence that consumption of glycerol is directly related either to weight of culture obtained or to change in acidity. The initial fall in the acidity of the medium is largely due to the removal of the acids soluble in ether (lactic acid, etc.). Further important factors in producing change in acidity are the production and removal of ammonia (free and saline) and the digestion of the proteins."

Part 2 is devoted to a study of the relation of the ash and phosphoric acid present in tubercle bacilli of different origins. The conclusion is reached that it is impossible to characterize tubercle bacilli of different origins by the amount or composition of the ash, or the phosphoric acid which they contain. See also other notes (E. S. R., 10, p. 1016; 13, p. 934; 14, p. 698).

Hypersensitiveness to tuberculo-protein and to tuberculin. C. R. AUSTRIAN (*Bul. Johns Hopkins Hosp.*, 24 (1913), No. 267, pp. 141-147; *abs. in Jour. Amer. Med. Assoc.*, 60 (1913), No. 21, p. 1665).—The experiments confirm other already demonstrated facts that "(1) a protein substance can be obtained by the extraction of tubercle bacilli with water, and with it animals can be actively sensitized; (2) that a refractory condition to this protein can be produced; and (3) that the hypersensitive condition is transmitted from mother to young. [The author's] experiments establish further that active sensitization induced by treatment with this protein may be as regular in its development and as intense in its manifestation as is that produced by treatment with other proteins. Passive homologous and heterologous hypersensitiveness can occasionally be produced with the blood or with the serum of an actively sensitized animal. The material transmission of the hypersensitiveness does not take place through the milk. The regularity with which maximum hypersensitive-

ness can be produced is largely dependent on the use of a sufficient amount of protein in preparing and in testing the animals. All the manifestations of typical hypersensitiveness to protein can be produced in guinea pigs by treatment with aqueous extracts of tubercle bacilli. Guinea pigs can be sensitized with albumose-free tuberculin and with old tuberculin that has been freed of glycerol and made poor in salts; and sensitization with any of these products causes the animal to react to injections of the others.

"Hypersensitiveness to tuberculin develops within 7 to 15 days after infection with the *Bacillus tuberculosis*. Tuberculous animals can occasionally be intoxicated with tuberculo-protein, developing symptoms of hypersensitiveness. The passive transference of hypersensitiveness from a tuberculous man to normal guinea pigs has been successfully accomplished and positive results have likewise been obtained when the serum of a sensitized animal has been injected into an untreated one. The type of the reaction symptoms and the development of them in an infected host after the administration of minimum doses of tuberculin are likewise suggestive facts."

The author is of the opinion that the evidence gathered justifies the interpretation of the tuberculin reaction as a manifestation of hypersensitiveness.

Tuberculin in diagnosis and treatment, L. HAMMAN and S. WOLMAN (*New York and London, 1912, pp. XIV+381, figs. 35*).—This publication contains a detailed description of the various tuberculin reactions utilized at the present time, and discusses the scientific principles underlying the diagnostic and therapeutic use of tuberculin. These topics are considered particularly from the human standpoint.

The relative value of turtle tuberculin in the treatment of tuberculosis, W. J. BEATTIE and E. E. MYERS (*N. Y. Med. Jour., 98 (1913), No. 11, pp. 503-507*).—A discussion in regard to Piorkowski's antigen, the Friedmann cure, and von Ruck's vaccine. The use of Piorkowski's tuberculin for this disease in man is described in detail.

Treatment of tuberculosis with attenuated tubercle bacilli treated with sodium fluorid, G. RAPPIN (*Arch. Gén. Méd., 203 (1913), pp. 262-278; abs. in Jour. Amer. Med. Assoc., 60 (1913), No. 19, p. 1497*).—The vaccines used in treating laboratory animals were made from attenuated tubercle bacilli deprived of their protective envelope by sodium fluorid. The cultures used in the experiments have been cultivated since 1894, and this is the fourth report on the topic. The results obtained with guinea pigs were very satisfactory.

On a remarkable new type of protistan parasite, H. M. WOODCOCK and G. LAFAGE (*Quart. Jour. Micros. Sci. [London], n. ser., 59 (1913), No. 235, pp. 431-457, pls. 2, figs. 2*).—This paper describes a new type of parasitic Protista which inhabits the rumen of animals, especially of the goat, to which the authors have given the name *Selenomastix ruminantium*.

"Apparently the only flagellates from which the organism could be derived are the dinoflagellates and, apart from the transverse division, there is no indication of any affinity with this group. Further, the nature of the nucleus and the capacity of moving by the body alone make it very doubtful if this parasite is a true protozoan. *S. ruminantium* differs in important respects from any known bacteria. It has no affinities with schizosaccharomycetes, with Blastocystis, nor with the spirochetes. In certain characters it shows a resemblance to one or two large spirillar forms, or to certain members of the sulphur bacteria (e. g. *Ophidomonas*), but while its derivation is possibly to be sought in this direction, it is, nevertheless, very far removed from such forms. We may have in *Selenomastix* an example of a proflagellate."

The relation of lungworms of sheep to those of deer, E. RICHTERS (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 13 (1913), No. 5, pp. 251-272, figs. 15; abs.*

in *Internat. Inst. Agr. [Rome], Mo. Bul. Agr. Intel. and Plant Diseases*, 4 (1913), No. 7, pp. 1058, 1059).—Investigations were carried on to determine the species of *Strongylus* occurring in the lungs of sheep and deer and how the embryos and mature parasites differ from each other.

On an average, 95 per cent of those found in sheep are *Strongylus filaria* (*Dictyocaulus filaria*) and 5 per cent *S. commutatus* (*Synthetocaulus commutatus*). In many hundreds of lungs examined by the author no other species were found. The sexually mature worms occurred either in the tracheæ or in the bronchi, never in the lung tissue. The author finds *S. commutatus* to be a distinct species, but, contrary to hitherto accepted opinions, *S. capillaris* (*Synthetocaulus capillaris*) and *S. rufescens* (*Synthetocaulus rufescens*) found in sheep appear to be identical.

The lungworms found in deer are exclusively *S. micrurus* (*Dictyocaulus micrurus*), neither *S. micrurus*, *S. sagittatus* nor any other species being found in the 100 cases investigated. Thus it would appear that the lungworms of sheep are distinctly different from those of the deer and that transuission from sheep to deer is very unlikely.

A bibliography of 64 titles is appended.

Anaplasmosis of the sheep in German East Africa, O. TRAUTMANN (*Berlin. Tierärztl. Wchnschr.*, 29 (1913), No. 33, pp. 593, 594).—The author confirms the previous observations of Schellhase* of the occurrence of anaplasmosis (*Anaplasma marginale*) of sheep in German East Africa.

Cholera in northwest Iowa, O. W. JOHNSON (*Breeder's Gaz.*, 64 (1913), No. 22, pp. 1033, 1039).—It is pointed out that hog cholera may be disseminated by crows, since they feed on the carcasses of dead hogs and may then fly from 1 to 20 miles and light in hog pastures or in trees under which hogs seek shade.

The practical treatment of the horse, W. H. EDGAR (*Atlanta, Ga.*, 1913, pp. 96).—A popular account.

Cerebro-spinal meningitis of the horse, B. F. KAUFF (*Amer. Vet. Rec.*, 44 (1913), No. 1, pp. 75-87, fig. 1).—The author discusses the history of the outbreak of cerebro-spinal meningitis in the Middle West in 1912, particularly in Colorado, and its differential diagnosis; and reports several cases of the disease, including histological and bacteriological studies. He states that no definite conclusion as to the cause of the disease can at the present time be drawn.

Treatment of pectoral influenza (Brustseuche) with neosalvarsan, STÖBTER (*Berlin. Tierärztl. Wchnschr.*, 29 (1913), No. 11, pp. 135-138; *abst. in. Rev. Gén. Méd. Vét.*, 21 (1913), No. 249, pp. 518-520).—Two horses treated by the author on the third day and a third on the fourth day of the disease, with intravenous injections of 4½ gm. of neosalvarsan in 150 gm. of lukewarm (22° C.) 0.4 per cent salt solution, made rapid recoveries. The only objection to the use of this preparation is its high price, each injection costing 42 marks (\$19.00), and it is estimated that the high percentage of recovery resulting, the shortening of the course of the disease, and the complete and definite cure make its use economical. It is stated that during 1911, 226 animals were treated with salvarsan with but a single loss, although the usual mortality from the disease runs from 5 to 20 per cent.

Concerning the beri-beri-preventing substances or vitamins contained in rice polishings—a sixth contribution to the etiology of beri-beri, E. B. VENDER and R. R. WILLIAMS (*Philippine Jour. Sci., Sect. B*, 8 (1913), No. 3, pp. 175-195).—Investigations are reported in continuation of earlier work (E. S. R., 29, p. 180).

Some of the conclusions follow which were drawn from experiments reported.

*Berlin. Tierärztl. Wchnschr., 28 (1912), No. 28, pp. 511, 512.

"Undermilled rice may be stored for 1 year in a damp place without losing its protective powers against polyneuritis gallinarum. It is improbable therefore that a rice which originally affords protection against beri-beri will lose this property by storage even in damp places. . . .

"The therapeutic properties of an alcoholic extract of rice polishings are greatly altered by hydrolysis (treatment with 5 per cent hydrochloric or sulphuric acid). The unhydrolyzed extract is not poisonous and is only slowly curative. The hydrolyzed extract is exceedingly poisonous in large doses and promptly curative in small doses.

"We have confirmed Funk's observations by isolating a crystalline base from an extract of rice polishings by Funk's method. This base in doses of 30 mg. promptly cured fowls suffering from polyneuritis gallinarum. . . .

"Two groups of substances (purin bases, cholin-like bases) may be isolated from rice polishings in addition to Funk's base and are capable of partly or wholly protecting fowls fed on polished rice against polyneuritis gallinarum, but are incapable of curing fowls that have already developed the disease. The chemical nature of these two groups of bases requires further investigation. . . .

"It is probable that this base [Funk's base] or vitamin exists in food as a pyrimidin base combined as a constituent of nucleic acid, but that it is not present in the nucleins or nucleic acids that have been isolated by processes involving the use of alkalis or heat."

The authors regard their results as affording striking and confirmatory evidence for the hypothesis which has been previously advanced that wet beri-beri and dry beri-beri are two distinct conditions, each being caused by the deficiency of a separate vitamin.

Other conclusions have to do chiefly with the chemical characteristics of the vitamins and clinical experience.

The use of milk cultures of *B. bulgaricus* in the prevention and treatment of bacillary white diarrhea of young chicks, L. D. BUSHNELL and O. MACREX (*Amer. Vet. Rev.*, 44 (1913), No. 2, pp. 194-207).—Following a general review of the subject the authors report feeding experiments with *Bacillus bulgaricus* and *B. pullorum*, which they consider, demonstrate the effectiveness of milk cultures of *B. bulgaricus* in this disease.

The treatment of fowl cholera with quinin, HALLENBERGER (*Arch. Schiffs u. Tropen Hyg.*, 17 (1913), No. 13, pp. 466, 467).—The author has found the injection of 0.5 gm. quinin bimurate to give good results both as a therapeutic and prophylactic agent.

A list of current medical periodicals and allied serials (*Chicago: John Crerar Library*, 1913, 2. ed., pp. 32).—A list of medical periodicals which deal both with human and veterinary medicine.

RURAL ENGINEERING.

Irrigation from reservoirs in western Kansas and Oklahoma (*U. S. Senate*, 62. Cong., 3. Sess., Doc. 1021, 1913, pp. 54, pls. 8, figs. 10).—This document, prepared by R. D. Robertson and S. T. Harding, reports investigations of the feasibility and economy of irrigation from reservoirs in the 18 western counties of Kansas and the 2 western counties of Oklahoma, lying west of the line of 20 in. mean annual rainfall. A general reconnaissance was made, and 5 sites, 2 of them large, were surveyed in Kansas.

It is concluded that while neither time nor funds were available for a thorough investigation of the storage possibilities of these 2 sections, such opportunities as were found for irrigation development by storage are not promi-

ing, and considered in relation to the total agricultural area the total acreage which can be supplied with water will never be more than a very small percentage of the available land. The general irregularity and torrential character of the flow of streams make it practically necessary to store on the stream beds, and with the small and unsatisfactory supplies that are found on all but 1 or 2 of the streams, proper development of sites can not be considered practical.

High-land pumping plants are being installed in the Arkansas Valley from which the annual cost of water will be in excess of \$10 per acre so that for such pumping to be profitable the best agricultural use must be made of the land. The small windmill or other pumping plant with storage reservoir or the small reservoir to store sufficient storm run off to supply the garden products and trees is the class of irrigation development which is deemed the most promising for this area in general, although attempts to irrigate more than enough crops for home consumption by this method have not been generally successful. The most significant new development now taking place is the pumping from the underground waters on the uplands with lifts of over 100 ft.

Hydraulic laboratory for irrigation investigations, Fort Collins, Colo., V. M. COXE (*Engin. News*, 70 (1913), No. 14, pp. 662-665, figs. 5). A description is given of the most important features of the new hydraulic laboratory, constructed under a cooperative agreement between the irrigation investigation division of this Office and the Colorado Experiment Station, for the purpose of testing and determining the accuracy of various water measuring devices and supplying correct formulas for their use.

Report of the water rights branch of the department of lands (*Rpt. Water Rights Branch Dept. Lands, Brit. Columbia, 1912*, pp. 129, pls. 14, figs. 22).—This report contains the following articles pertaining to water supply and irrigation: Irrigation's Part in the Future Upbuilding of British Columbia, by S. Fortier (pp. 10-14); Water Legislation and Administration in British Columbia, by H. W. Grunsky (pp. 15-23); Shall Water Licenses be Perpetual? by O. C. Merrill (pp. 23, 24); Collection and Filing of Hydrographic Data, by E. Davis (pp. 25-28); Water-power Investigations in the Columbia River Drainage Basin—Progress Report, by G. G. Donald (pp. 31-39); Description of Work at Hydrographic Station near Nelson, by H. F. Meurling (pp. 41-43); Suitable Designs for Small Headgates, by F. C. Seeley (pp. 44-48); Watersheds of British Columbia—Characteristics and Possibilities, by H. W. Grunsky et al. (pp. 49-100); Forms used under the "Water Act" (pp. 100, 102); and Forms proposed by S. Fortier and H. W. Grunsky (pp. 103-105).

A study of irrigation heads in the Modesto and Turlock irrigation districts, California (*Engin. News*, 79 (1913), No. 11, pp. 562, 563). Studies of volumes of water in second-feet delivered to each individual irrigator and of the time the head is used per acre of land were made by P. C. Berkefeldt in these districts, where alfalfa is the principal crop raised. A summary of the conclusions as to the best practice in both districts is as follows:

The strip system of checking is the cheapest and most economical of water where the topography will permit its use, otherwise a combination of square and strip checks is best. The best width of strip check is from 50 to 75 ft., the best length about 600 ft., and the best grade from 2 to 4 in. per one hundred feet. Farmer's ditches should have at least 6 ft. bottom width with gates the same width. For fairly sandy and sandy soils the use of a larger head for a shorter period of time is best for alfalfa; on the average, not less than 15 second-feet head for from 20 to 30 minutes per acre, irrigating one check at a time. For trees, vines, etc., in the same soil about 5 second-feet for an hour

per acre is best, irrigating 3 or 4 rows at once. Water should be applied directly to each check from the ditch and the water surface in the ditch should be at least 1 ft. above the highest check.

Derivation of run-off from rainfall data, J. D. JUSTIN (*Proc. Amer. Soc. Civ. Engin.*, 39 (1913), No. 6, pp. 1211-1228, pl. 1, figs. 20).—In an attempt to develop a rational method of deriving run-off from rainfall data on various watersheds the author found that on the watersheds examined the relation may be expressed by the formula $C=KR^2$, in which C is the annual run-off in inches, R the annual rainfall in inches; and K is a constant depending on the variations in the relations between rainfall and run-off from one watershed to another, depending on slope and mean annual temperature. Comparisons of numerous watersheds also indicated that the relation of run-off to rainfall may be expressed by the general formula $C=0.934 S^{0.155} K^2$, in which T is the mean

annual temperature and S the slope of the watershed (the difference between the highest and lowest elevations divided by the square root of the area).

Numerous rainfall and run-off curves and tables of data are presented to substantiate this view, and tables are given to aid in the solution of the formula. The author believes this formula to be applicable to watersheds in the eastern United States and suggests its use, in that part of the country, where run-off data are meager or lacking.

Seepage losses from earth canals, E. A. MORITZ (*Engin. News*, 70 (1913), No. 9, pp. 492-495, figs. 2).—This article considers the so-called nonpreventable losses from seepage or percolation through the bed or banks of earth canals, and presents figures said to represent the average results obtained from observations on several hundred miles of canals on 8 different reclamation projects to express the losses in terms of depth in feet in 24 hours through the wetted perimeter of the canal prism as follows: Cement gravel and hardpan with sandy loam 0.34 ft., clay and clay loam 0.41 ft., sandy loam 0.66 ft., volcanic ash 0.68 ft., volcanic ash with some sand 0.98 ft., sand and volcanic ash or clay 1.20 ft., sandy soil with some rock 1.68 ft., and sandy and gravelly soil 2.20 ft. It is concluded that the limits within which seepage losses should be considered in earth canal design may be generally defined as 0.5 ft. and 2.5 ft. per 24 hours over the wetted area of the canal.

From a mathematical consideration of seepage losses the following equation is derived: $s=0.2 c \times \frac{Q}{V^2}$, in which s is the seepage loss in second feet per mile of canal, Q the canal discharge, V the mean velocity of flow, and c an experimental coefficient equivalent to the depth of water in feet lost over the wetted area in 24 hours.

A diagram plotted from results obtained from this equation, using values of c varying between the above prescribed limits, is given. This shows the effect of variations in velocity on these results and the advantages of using as high velocities as possible. The magnitude of the error claimed to be involved in stating the seepage loss in percentage of the flow is also illustrated.

The development of balancing devices for centrifugal pumps, A. V. MUELLER (*Engin. News*, 70 (1913), No. 11, pp. 490-494, figs. 21).—Several devices for caring for the axial thrust of the shaft in centrifugal pumps are described and their design analyzed. Both partial and complete balance devices are dealt with, and it is stated in conclusion that entirely automatic devices have the advantage over incompletely balanced devices in that they rid the pump of such members as marine thrust collars, ball bearings, etc., which are a constant source of trouble.

Construction of concrete pipe lines. B. A. ETCHVEZERY (*Jour. Electricity*, 31 (1913), No. 6, pp. 128, 129, fig. 1).—This article gives data on making, hauling, trenching for, and laying cement pipe, including tables of cost of this work on several private irrigation projects.

Large clam shell dredges: levee building methods and standards in California. F. H. TIBBETTS (*Engin. News*, 70 (1913), No. 19, pp. 456-459, figs. 8).—This article describes dredging machinery developed to meet conditions in land reclamation in California. Cross sections of levees are given and methods of flood control of the Sacramento River described.

A study of the comparative economy and convenience of steam operated and electrically operated pumping plants for drainage (*Engin. and Contract.*, 40 (1913), No. 14, pp. 371-374).—An abstract of a paper read before the fourth meeting of the Association of Drainage and Levee Districts of Illinois, which contains an argument for the use of electric power for operating drainage pumping plants and assemblies and states considerable comparative data on pumping costs and efficiencies.

It is concluded, since the total cost of steam pumping in well designed plants closely approximates \$1.25 per acre per year, that with electrical energy at 4 cts. per kilowatt hour the total cost of electric pumping does not exceed that of steam pumping, and has many advantages over other kinds of power from the standpoint of actual economy, efficiency, and convenience in operation.

Ground water movements, drainage methods, and open channel drainage. L. SCHMEER (*Engin. and Contract.*, 40 (1913), No. 14, pp. 449-453, figs. 9).—This is a study of open ditch land drainage in which the movement of water in various soils is considered and hydraulic formulas derived for estimating the probable flow from water-bearing soils into ditches, tunnels, infiltration galleries, or wells. Considerable data are given for designing drainage channels to meet various conditions of topography, rainfall, run-off, and soil porosity, and reference is made to various drainage areas.

Land drainage in Louisiana. A. M. SHAW (*Engin. News*, 70 (1913), No. 7, pp. 300-303, figs. 6).—This article describes the reclamation of timber swamps and prairies which are some distance back from the river, levee construction on trembling prairies, types of dredging plants, including dipper, orange peel, and hydraulic dredges, and the use of power plows for excavating drainage ditches.

The drainage of Lower Egypt. W. WILLCOCKS and M. V. MOSSERI (*Cairo*, 1912, pp. 11, pl. 1).—It is stated in this pamphlet that the effective drainage of Lower Egypt is impossible without pumping and that this pumping can best be done by the Government. Pumping drainage projects in this locality are described with cost data of operation.

Drainage and purification of the soil. R. GAGEX (*Bul. Dir. Gén. Agr. Com. et Colon. Tunis*, 17 (1913), No. 67, pp. 46-53, figs. 47).—This article deals with various methods of disposing of excess surface and underground water as practiced in Tunis, describes several typical drainage and land improvement projects in that country, and notes briefly the local drainage laws.

Text-book on highway engineering. A. H. BLANCHARD and H. B. BROWN (*New York and London*, 1913, pp. XIII+762, pls. 4, figs. 233).—The authors have attempted in this work to give sufficient details to acquaint the student thoroughly with the principles and practice of modern highway engineering, and in addition to make it sufficiently broad in its scope and content with reference to materials, construction, maintenance, specifications, and cost data to serve as a comprehensive reference book upon the subject of highway engineering for the experienced engineer. The subject matter is presented under the

following chapters: Preliminary investigations; surveying and mapping; design; drainage; foundations; earth and sand-clay roads; gravel roads; broken stone roads; bituminous materials; dust prevention by the use of palliatives; bituminous surfaces; bituminous gravel and bituminous macadam pavements; bituminous concrete pavements; sheet asphalt and rock asphalt pavements; wood-block pavements; stone-block pavements; brick pavements, concrete pavements, miscellaneous roads and pavements; street cleaning and snow removal; car tracks; pipe systems; comparison of roads and pavements; sidewalks, curbs, and gutters; bridges, culverts, and guard rails; and economics, administration, and legislation.

Hard roads in Wayne County, Michigan (*Engin. Rec.*, 68 (1913), No. 13, pp. 340-342, figs. 8).—A more complete description of this work, which has been previously noted (*E. S. R.*, 27, p. 789), is given, including a note on Michigan road laws, data on concrete road specifications, and details of methods of construction.

Asphalt paving cements and road binders, J. W. HOWARD (*Engin. Rec.*, 68 (1913), No. 13, pp. 345-347).—In pointing out the necessary qualities of asphalt paving cement and road binders and describing laboratory methods for determining them, the author claims from his experience that specifications containing tests for gravity, fixed carbon, paraffin, etc., and only parts of the standard and useful tests are directly in favor of certain limited asphalt products and exclude others which may be as good or better. He advocates as the basic and essential qualities, which should be specified, the following: Adhesiveness, waterproofness, immutability, cohesiveness, ductility, flexibility, malleability, consistency at mean weather temperature, minimum susceptibility to extreme weather temperatures, purity, and freedom from injury by necessary melting heat.

Puzzolan mixtures tested for Oregon roads, E. H. MCALISTER (*Cement Era*, 11 (1913), No. 10, pp. 66, 68).—Tests of various blends of Portland cement and Oregon puzzolans made by the author in an attempt to reduce the cost of concrete roads in that State indicate that a commercial product of excellent quality may be produced if puzzolan material is reground with cement 1:2 by weight. Comparative cost data show a great saving in favor of puzzolan mixtures if used on a large scale.

Road rollers in the Netherlands, L. C. STEFFELAAR ET AL. (*Internat. Assoc. Road Cong.*, III. Cong. [London], 1913, [Pub.] 73, pp. 25, figs. 19).—This pamphlet deals with road rollers and road rolling in the Netherlands, giving descriptions of a few modern horse-drawn road rollers and their accessories. These are followed by a discussion of the differences in first cost and cost of maintenance between roads which are rolled and roads not rolled, including tables of cost data from the use of horse and steam engine drawn rollers.

The advantages claimed for a modern horse-drawn roller owned by a department are as follows: It can be used in places and under conditions impossible for an engine-drawn roller, is always available at favorable periods, can be profitably used on road improvements of minor importance and on continuous maintenance of roads, and the purchase price is comparatively small. The principal disadvantages are that the road surface is injured by the horses' hoofs, the work is slower than with a traction engine, and good horses are not always available at a reasonable price.

Tests on small gasoline engines, F. M. and E. A. WHITE (*Powcr*, 38 (1913), No. 9, pp. 299-301, figs. 5).—Tests were made to determine the fuel consumption, in pounds per horsepower hour for varying loads, of 12 small farm internal combustion engines using gasoline as fuel. Three general classes of 4 engines each were made, ranging in power from 3 to 4½, 5 to 7, and 8 to 10 h. p. and

classified as 3, 6, and 10 h. p. sizes. With 1 exception 1 engine of each class was obtained from the same manufacturer and each engine was tested under no load, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, and full load.

The engine details and the test data are given in tabular form. The cost of fuel per brake horsepower was estimated on the basis of gasoline costing 16 cts. per gallon. The length of time for each test depended upon the time required to bring the fuel consumption approximately constant. At no load this occurred in about 90 minutes, at quarter load after 75 minutes, at one-half load after 60 minutes, at three-quarter load after 45 minutes, and at maximum load after 15 minutes. The fuel consumption became constant before the temperature of the jacket water.

Curves showing the fuel consumption at various loads for each class indicate that for the 3 and 5 to 7 h. p. engines the economy was greatest at the three-quarter load while for the 8 to 10 h. p. engines it was secured at the maximum loads. Curves showing total fuel, minus that at no load, indicate that up to three-quarter load the friction load of the engine is the chief factor in determining the fuel economy. The 3 and 5 to 7 h. p. classes showed that from three-quarter to maximum load other factors entered which caused a very rapid increase in the fuel consumption per horsepower hour while the 10 h. p. class showed little increase.

In determining economical sizes for given horsepowers, curves showing the fuel consumption at different loads for different cylinder displacements, which correspond to the 3, 6, and 10 h. p. classes, indicate that from 1.7 to 3 h. p. the engines having a piston displacement of 90.4 cu. ft. per minute were as economical as those having a piston displacement of 55.7 cu. ft. per minute, and that the larger displacement was more economical from 3 to 4 h. p. From 4 to 6.75 h. p. the engines having an average displacement of 90.45 cu. ft. per minute were more economical than those having a displacement of 125.4 cu. ft. per minute, but from 6.75 to 10 h. p., the larger displacement was most economical.

It is concluded that from 1 to 6.75 h. p. the engine having a displacement of 90.4 cu. ft. per minute corresponding to a rated 6 h. p. engine is, so far as economy in fuel consumption is concerned, the most desirable engine. For horsepowers above 6.75 the engine having a piston displacement of 125.4 cu. ft. or the 10 h. p. engine, would be the most desirable.

A new method of cooling gas engines. B. HOPKINSON *1628 Engine, 15 (1913), No. 10, pp. 568-575, figs. 2; Power, 38 (1913), No. 16, pp. 332-333, fig. 11.*—It was found that by injecting cold water in comparatively coarse jets against the internal surface of a gas engine cylinder and the piston head the metal can be kept cool without materially cooling the gases. Other experiments showed that for practical purposes the heat flow into the barrel of the cylinder during the last three-fourths of the expansion stroke was very small compared with that in the first period, so that it was necessary only to direct the spray against the walls in the combustion chamber and the piston, the rest of the cylinder being cooled by conduction. Results of actual tests verify these claims, and it is concluded that the economy is unaffected by the use of this method of cooling since there is no apparent loss in efficiency.

A traction engine whose four wheels are driving wheels (*Engin. and Contract., 40 (1913), No. 7, pp. 172, 173, fig. 1*).—A novel traction engine is described which has all 4 wheels the same size and each wheel carrying one-fourth the total weight of the engine. The power plant is a self-balanced 2-cylinder, 4-cycle engine. The transmission is through a pinion and large cut gear to a cast-steel gear case under the center of the frame, from which the

power is transferred by chain drive to differentials on both rear and front axles.

It is claimed that this tractor is very economical in fuel consumption and is able to operate under conditions impossible for the use of the ordinary tractor.

Trials with liquid manure spreaders. M. DALL and C. L. FEILBERG (*Tidskr. Landökonomi*, 1912, No. 7, pp. 404-433, figs. 12).—Trials with 18 different sprinkling carts are described, and the strong and weak points of each machine are discussed.

The trials of corn and seed drills, 1912. C. P. HALL (*Jour. Roy. Agr. Soc. England*, 73 (1912), pp. 358-365, figs. 4).—The drills were tested in 2 classes: Class 1, drills for corn and pulse, and class 2, drills for grass and clover, coulters and broadcast.

Eight machines were entered in the first-class trials and thoroughly tested for ease and accuracy of adjustment, even distribution of seed, adaptability to various seeds, weight, simplicity of construction, combined with strength, number of attendants, general efficiency, and price. A 13-row and a 12-row corn and seed drill, both of the same manufacture, were awarded first and second honors, respectively.

Only one machine, which was of the same make as the winners of the first-class trials, was entered in the second-class trial. It effected such satisfactory drilling by rows and by broadcasting that it was given first honors, regardless of the absence of competition.

In these trials recent improvements of the various parts apparently played no great advantages. The disk type of coulters was classed as no improvement, and the old-fashioned cup feed demonstrated its superiority over all new types. The results in general indicate that the machines tested are far from perfect, and it is stated that a comparison of results obtained in these trials with similar trials held in 1874 shows little improvement and practically no alteration.

Grain cleaning contest (*Canad. Thresherman and Farmer*, 18 (1913), No. 8, pp. 39, 40, figs. 4).—Three types of grain cleaners were entered in these tests, including 8 machines, 6 of them hand driven and 2 power driven. Wheat, oats, barley, flax, and timothy were used in the tests.

Considering power acquired, capacity, design and construction, and efficiency, the highest score attained out of a possible score of 500 points was 391 points for the hand-driven machines and 411 points for the power-driven machines. Out of a total of 175 points on efficiency, including percentage of waste grain and grain grading, the same machines attained the highest score of 135 points for the hand machine and 132 points for the power machine.

Test of a feed-grinding and sifting mill. J. REZEK (*Mitt. Landw. Lehrkanz. K. K. Hochsch. Bodenkul. Wien*, 1 (1913), No. 4, pp. 558-589, pl. 1).—A brief description of the mill and its adjustable parts is followed by the results of tests.

The mill was driven by an electric motor. Barley containing 12.39 per cent moisture and weighing 70.9 kg. per hectoliter (about 55 lbs. per bushel) was ground to a fine meal at the rate of 246.3 kg. per hour, the speed being 581 r. p. m., and the necessary horsepower, 3.13. Oats containing 11.88 per cent moisture and weighing 51 kg. per hectoliter was ground at the rate of 310 kg. per hour, the speed being 614 r. p. m., and the necessary horsepower 1.45. Corn containing 14.39 per cent moisture and weighing 75.8 kg. per hectoliter was ground into 3 sizes by 3 different adjustments, the first yielding coarse meal at the rate of 527.7 kg. per hour, the second a somewhat finer meal at the rate of 385.4 kg. per hour, and the third a very fine meal at the rate of 197.1 kg. per hour, at respective speeds of 618 r. p. m., 614 r. p. m., and 602 r. p. m., and respective necessary horsepower of 1.05, 2.6, and 2.15.

The sifters were thoroughly tested in connection with the mill by grinding and sifting rye containing 13.89 per cent moisture and weighing 70.9 kg. per hectoliter. Four sifters were used in the following order: A No. 20 with 20 wires per 26 mm., 2 No. 8 with 34 wires, and a No. 9 with 38.5 wires. This test was run under 3 different adjustments and speeds yielding flour, coarse meal, and bran in varying quantities. The results indicate that the most satisfactory speed for this purpose is between 560 and 570 r. p. m. With the same arrangement 25 kg. of bulled rye underwent a similar process for 1 hour and 14 minutes. Within 17 minutes the yield was as in the first 3 tests. After 48 minutes more, 11.68 kg. of fine medium white flour and 4.50 kg. of fine black flour had been yielded. At this point the following arrangement of sifters was substituted: A No. 18 sieve, with 18 wires per 26 mm., a No. 8, a No. 9, and a No. 5, which contained 1 wire per mm. Within 7 minutes the remainder of the rye was reduced to 1.24 kg. of fine flour, 2.13 kg. of coarse flour, 1.18 kg. of fine bran, and 0.145 kg. of coarse bran. The maximum horsepower required in this test was 3.3 and the average 1.4, and the average power consumption was 2.2 h. p. hours.

Diagrammatic plans of the mill are given with curves of the test results.

The effect of saturation on the strength of concrete, J. L. VAN ORNUM (*Proc. Amer. Soc. Civ. Engin.*, 39 (1913), No. 6, pp. 1229-1236, fig. 1). Results of several series of tests on concrete specimens, both plain and reinforced, indicate a rapid decrease in strength for the first 2 days of submergence and a systematic increase in strength thereafter. Specimens stored for 38 days in air underwent a rapid decrease in strength when placed in water for 2 days or less but increased in strength after saturation was complete.

Test of pressure of wet concrete, E. B. GERMAIN (*Engin. News*, 70 (1915), No. 7, pp. 294, 295, figs. 2).—A recent test of the pressure of wet concrete to determine the proper figures to be used in the design of forms was made on small area columns where a high head could be produced in a short time. The apparatus used consisted of an ordinary hot water bag filled with water, a test tube containing mercury inside the bag, and a hollow glass column running from below the surface of the mercury in the tube through a rubber stopper in the neck of the hot water bottle. Six of these bags were placed in each of 2 columns, 20 in. square and about 20 ft. high, and the mercury levels read on each after the column was filled, the difference in levels of the mercury in the test tube and in the column giving the pressure in inches of mercury.

Using a mixture of 1:1½:3, the pressure per square inch was 490 lbs. with a head of 3.08 ft., 900 lbs. for 6.08 ft., 1,330 lbs. for 9.08 ft., 1,710 lbs. for 12.08 ft., and 2,110 lbs. for 15.08 ft. With a mixture of 1:1:1 the pressure was 407 lbs. for 2.75 ft., and 840, 1,280, 1,700, 2,080, and 2,450 lbs., respectively, for heads of 5.75, 8.75, 11.75, 14.75, and 17.75 ft.

Since the first concrete put in begins to set before the last concrete is poured, the pressures in the lower part of the columns do not show quite full liquid pressure.

Tests of reinforced concrete buildings under load, A. N. TALBOT and W. A. SLATER (*Univ. Ill. Engin. Expt. Sta. Bul.* 64, 1913, pp. 174, figs. 75). This bulletin records the results of field tests made on 3 reinforced concrete floor systems, 2 of the beam and girder type and 1 of the flat slab type. In addition is included a discussion of the method of testing, the use of the instruments, methods of observation, precautions to be taken, accuracy of results, and methods of loading.

No specific conclusions are drawn because of the wide scope of the tests.

Constructing a silo roof of concrete (*Building Age*, 35 (1913), No. 8, pp. 367, 368, figs. 4).—The construction of a conical reinforced concrete silo roof is

described in which a 1:2 sand and cement mortar is placed on expanded metal reinforcing having not less than a 3 in. mesh. A roof thickness of 2 in. is deemed sufficient for diameters of silos up to 10 or 12 ft. and 3 in. for diameters up to 20 ft. The vertical roof load is converted into tension at the circumference, which is taken care of by horizontal circular reinforcing. Tables are included for reinforcing both monolithic concrete and concrete block silos.

The pit silo for western Kansas, C. McKee (*Agr. Ed. [Kans. Agr. Col.]*, 5 (1913), No. 14, pp. 12, figs. 2).—It is the purpose of this bulletin to point out to the dry-land farmer of limited means in western Kansas the possibilities of the pit silo and to give directions for its construction.

The essentials of a good pit silo are briefly summarized as follows: The silo must be located in firm, dry, and well-drained soil, and must have a curb extending a few inches above ground and a little below frost line. The walls should be absolutely perpendicular and smooth, plastered from $\frac{1}{4}$ to 1 in. thick, washed with a cement coat to make them air and water tight, and if they become dry before plastering they should be sprinkled lightly. A covering must be provided to keep out dirt, animals, etc., and to provide for free air circulation.

It is claimed that the pit silo is cheap, easily constructed, does not require a silage blower, and will not blow down. The silage will not freeze and will keep well if properly distributed and packed. No large cash outlay is necessary and no expensive forms are required in construction.

Farm water supplies, pumping machinery, and accessories, W. HOFFMANN (*Ztschr. Landw. Kammer Schlesien*, 17 (1913), Nos. 34, pp. 1205-1212, fig. 1; 35, pp. 1260-1265, figs. 9).—This article deals with the importance of pure water supplies for the farm and methods for obtaining it, and gives suggestions for determining the size of supply, specifications for piping and other conveying and distributing accessories, and directions for obtaining surface supplies and deep and shallow well and spring supplies. Descriptions of the construction and operation of hydraulic rams and types of small deep and shallow well pumps are given with instructions for their installation and use. In determining the size of supply it is suggested that for all purposes each person be allowed per day 20 liters, each horse 55 liters, each cow from 60 to 80 liters, each ox 70 liters, each calf 30 liters, each sheep 5 liters, and each pig from 20 to 80 liters.

Shower bath for country houses, C. Fox (*Pub. Health Rpts. [U. S.]*, 1913, Sup. 7, pp. 4, fig. 1).—A serviceable and inexpensive shower bath is described and illustrated for use in houses where there is no running water. It is made from a tin can such as is used in shipping kerosene or turpentine. The solder around the upper edges of the tin is melted off and the top removed. To the bottom are attached a stop cock and a shower head about 6 in. in diameter with very small outlet holes. The tin is lowered and raised by a rope running through a pulley attached to a rafter or other convenient support.

RURAL ECONOMICS.

A questionnaire on markets, J. W. FARLEY (*Ann. Amer. Acad. Polit. and Soc. Sci.*, 50 (1913), No. 139, pp. 139-152).—This article gives a list of 43 questions submitted to those in charge of the markets of 12 cities and summarizes their answers. The questionnaire covered the history, expense, sources of revenue, influence on producer and consumer, and other questions pertinent to city markets.

Some typical American markets.—A symposium (*Ann. Amer. Acad. Polit. and Soc. Sci.*, 50 (1913), No. 139, pp. 118-138).—This symposium comprises (1) Baltimore's Markets, by J. F. Thrift and W. T. Childs; (2) Municipal Markets

in Cleveland, by C. Kamp; (3) The Indianapolis Market, by A. Burk; (4) The Milwaukee Municipal Market, by L. Tiefenthaler; (5) Municipal Markets in Philadelphia, by A. Lippincott; and (6) The Rochester Public Market, by W. W. Merrill.

C. L. King outlines the purpose of this symposium and enumerates the principal points taken up by each of the other authors, such as the character of the market, charges, regulations, extent of use by farmers, encouragement given to farmers, effect of the market on prices, and the effect of marketing on the surrounding country. The other authors describe the conditions of the market in their city with these suggestions in mind.

Cleveland's retail markets. C. G. CARPENTER (*Agr. Student*, 20 (1913), No. 2, pp. 127-129, fig. 1).—The author describes the market conditions in Cleveland and concludes that the real value of the public market is that it furnishes a means of distributing the fresh products of the farm and garden to the most people at the lowest cost of distribution.

Car-lot markets and how they are supplied. F. ANDREWS (*Ann. Amer. Acad. Polit. and Soc. Sci.*, 50 (1913), No. 139, pp. 1-9). The author states that the more perishable of farm products give rise to special market problems. Some of those mentioned are the size of market, the location of market places, the sources of supplies, the methods used to obtain car-lot shipments, the handling of cars in transit, and the value and difficulties of various systems of market news.

Markets for American fruit (*Spec. Cons. Rpts.*, [U. S.], 1913, No. 62, pp. 54).—This abstract contains reports from consuls located in 23 foreign countries showing market conditions, tariffs and other regulations, prices, and source of supply of fruit. These reports are taken from replies to inquiries sent out at the request of the Pacific coast fruit growers' associations.

Prevention of waste and seasonal price fluctuations through refrigeration. G. K. HOLMES (*Ann. Amer. Acad. Polit. and Soc. Sci.*, 50 (1913), No. 139, pp. 48-56).—The author gives a summary of the results and the methods used in his investigation for the U. S. Department of Agriculture of the influence of cold storage on prices. See also previous notes (E. S. R., 28, pp. 871, 872).

The motor truck as an agency in direct marketing. S. A. PHILLIPS (*Ann. Amer. Acad. Polit. and Soc. Sci.*, 50 (1913), No. 139, pp. 29-34). The author concludes that the motor truck offers the farmer a wider sphere of activity, a choice of crops, markets, and buyers, lowers the haulage of cost, and will enable him to develop more remote and unproductive lands.

The Long Island home hamper. H. B. FULLERTON (*Ann. Amer. Acad. Polit. and Soc. Sci.*, 50 (1913), No. 139, pp. 166-170).—This article narrates the methods used to distribute market garden produce directly from the producer on Long Island to the consumer in New York City.

The cooperative lamb club as an agency for lower marketing costs. D. H. DOANE (*Ann. Amer. Acad. Polit. and Soc. Sci.*, 50 (1913), No. 139, pp. 216-222).—The author states that by forming an association at Goodlettsville, Tenn., the farmers were able to grade their lambs better and obtain a considerable advance over what they had been offered previously by local buyers.

An inquiry into agricultural credit and agricultural cooperation in Germany. J. R. CAMILL (*London: Bd. Agr. and Fisheries*, 1913, pp. XXXVI+302+226, pls. 2).—Under mortgage (long-term) credit the author describes in detail the land mortgage credit associations (*Landschaften*), state and provincial mortgage credit banks, joint stock mortgage banks, savings banks, credit for land improvement, Prussian provincial aid banks, rent charge banks, and insurance institutions and agricultural credit.

He concludes that the organization of institutional mortgage credit in Germany has been greatly facilitated by its complete system of registration of title and by the clearness of its mortgage law. Compulsory registration of title, as it exists in Germany, Austria, Hungary, and Russia, or, at least, compulsory registration of deeds (as in France, Belgium, Holland, and other European countries, as well as in America and British India), appears an indispensable prerequisite for the foundation of a system under which landowners may obtain mortgage credit on suitable terms by the issuing of land bonds which would rank as first-class securities in the general market.

Under personal (short-term) credit he discusses local cooperative banks and central cooperative banks. He considers that the growth of the personal-credit idea has been the result of necessity. Individual small farmers must rope themselves together with a more or less stable bond in order to be able to present to lenders and depositors a security which the latter can accept. The highly localized character of these organizations enables the members to know the trustworthiness and the business capacity of the borrower.

The principal types of cooperative agricultural societies are discussed, and the author claims that as a result of land reform a large number of small farms came into existence. In order to hold their own with the larger farmers they were compelled to adopt modern methods of intensive farming, employ manures, buy feeding stuffs, modern implements, and machinery, obtain suitable breeding stock, and put their produce on the market in sufficient and graded quantities without the incurring of undue cost. Because of these circumstances they were compelled to unite into a local cooperative society that was binding upon the individual members only as regards the particular objects aimed at by the organization. Thus the different types of cooperative societies had their origin.

In addition, the author describes the method of audit and inspection, and gives as an appendix to his report copies of laws and documents for practically all the kinds of organizations mentioned in his detailed statement. An extensive bibliography of German works on credit and cooperation is included, also a large number of statistical tables.

Cooperative purchase and use of stallions in Denmark (*Jour. Bd. Agr. [London]*, 20 (1913), No. 7, pp. 626-628).—The procedure usually followed in Denmark by an association for the cooperative purchase and use of stallions is described here in detail, with special reference to four associations organized in 1888. The average price of the stallions runs from about £344 to £500. The Government was authorized in 1887 to make grants to horse-breeders' associations to the extent of one-half of the purchase price of a stallion, with a maximum grant per stallion of £222. In 1911 there were 267 associations receiving a total subsidy of £9,360 and owning 281 stallions. The law of 1912 reduced the state subsidy one-half, i. e., the maximum amount for each stallion is now £111.

The experience of animal insurance societies in Holland (*Jour. Bd. Agr. [London]*, 20 (1913), No. 7, pp. 628, 629).—This article presents notes and statistics illustrating the experience of animal insurance societies in Holland in 1911, and makes comparisons with the experience of similar societies in England for the same year.

Some methods of financing the farmer. G. JONES ([*Denver, Colo.*]: *Chamber Com.*, 1913, pp. 16).—The author outlines the two systems of credit found in European countries. Under short-term credit societies he gives some reasons for the low interest obtained in European countries, and suggests some modifications that would make the banking system of the United States more adaptable for this purpose. He also explains the organization of long-term mortgage associations, and considers that the most important factor for facilitating loans

on real estate in Europe is the title registration law which in effect places the Government behind the title to all property.

Rural social development (*Bul. Univ. Wis., 1913, No. 391, pp. 139, pl. 1, figs. 22*).—The discussions at this conference were under the general topics of better home conveniences, the rural church as a social center, rural social problems, country clubs, and rural social centers. Each topic was treated by three or more persons, each relating in the main his own personal experience.

The farmer's outlook, R. T. HINCKES (*London, [1913], pp. 159*).—The author concludes that the outlook for British agriculture is more promising than for many years past because of the fact that the countries which have been supplying the principal part of agricultural products to Great Britain show a decrease in their exports. He considers that this decline in exports will continue and that the increase from other countries will not be sufficient to meet the future demand, so that the demand for home produce should increase.

Agricultural statistics (*Ann. Rpt. Bur. Indus. Ontario, 1912, pp. 5-16*). Statistics are given for the Province of Ontario for 1912 relating to the acreage, production, and value of crops, the number and value of live stock, and the number sold or slaughtered. Data are also included relating to weather conditions, the number of butter and cheese factories, and the quantity of milk used and of butter and cheese made.

Agricultural statistics of Ireland, with detailed report for the year 1912, T. BUTLER (*Dept. Agr. and Tech. Instr. Ireland, Agr. Statis. 1912, pp. XXXIV-147*).—This report contains statistics concerning the size of holdings, acreage and production of crops, and acreage of pasture, grazing land, and woodland for Ireland and its minor subdivision for 1912.

The introduction contains decennial comparisons showing that between 1851 and 1912 the acreage under cereal crops decreased from 3,999,491 to 1,265,687 acres, and other green crops, including flax, from 1,513,112 to 1,077,151 acres. The acreage devoted to growing hay increased from 1,216,408 to 2,487,339 acres. The number of horses increased from 521,595 to 617,522; cattle from 2,967,461 to 4,848,498; sheep from 2,122,128 to 3,828,829; swine from 1,984,857 to 1,323,957; and poultry from 7,470,694 to 25,525,724.

The number of holdings for the same period of less than one acre increased from 37,728 to 87,451, while those of a larger acreage decreased from 691,202 to 521,345. See also a previous note (*E. S. R., 27, p. 2961*).

Agricultural statistics of Bohemia (*Statist. Handb. Konigr. Bohemen, 2 (1913), pp. 180-233*).—Statistics relating to live stock, acreage and production of farm crops, weather conditions, and forestry are given for 1910, with similar statistics for earlier years.

AGRICULTURAL EDUCATION.

Education for farm life, S. AVERY (*Quart. Rpt. Kans. Bd. Agr., 32 (1913), No. 125, pp. 73-82*).—In this address the author reviews the progress of education in the United States with special reference to the farmer and its relation to the nation's general economic welfare. He emphasizes the importance of supplying those who are to be farmers with the kind of training that will enable them to become happy, free, and prosperous, and discusses the scope of agricultural instruction in the existing high school, the special agricultural school, and the agricultural college.

[**History and growth of the Kansas State Agricultural College**] (*Kans. Industrialist, 39 (1913), No. 53, pp. 3, figs. 17*).—An extended account of the history and growth of the Kansas College, prefaced in connection with the recent fiftieth anniversary celebration (*E. S. R., 29, p. 698*).

The agricultural course for women, GEORGIA E. CANTRELL (*Ann. Rpt. Missouri Bd. Agr.*, 45 (1912), pp. 584-587).—This article presents a brief summary of the agricultural course for women in the University of Missouri, with comments as to the expediency of such a course and the benefits to be derived.

The teaching of entomology in our agricultural colleges, W. LOCHHEAD (*Ann. Rpt. Ent. Soc. Ontario*, 43 (1912), pp. 38-40).—Instead of taking up the chief injurious insects by orders and keeping the relationships of the forms discussed constantly before the minds of the students, the author prefers to deal with them on a basis of their hosts during the first two years or diploma course in Canadian agricultural colleges. In the third year, in which students are preparing themselves to become investigators, teachers, etc., he advocates giving more attention to entomology as a science, this involving some familiarity with the families and chief genera. This he believes can be best acquired by practical work in the laboratory, devoting the fall term to a more detailed study of the anatomy of some typical insects and to a study of the chief families and common genera, and the winter term to a more detailed study of the economic forms. In the entomological instruction of the fourth year, taken by students who are specializing, special problems are assigned for study and discussion, and methods of work and a knowledge of the literature are emphasized. A plan of contents is suggested for a handbook on entomology.

Fit the rural school to the community, ELLEN B. McDONALD (*Business America*, 14 (1913), No. 2, pp. 164-170, figs. 5).—The author discusses the possibilities in the course of study, agriculture in rural schools, agricultural contests, and neighborhood interest.

The betterment of rural schools through agriculture: The Ohio plan, F. W. MILLER (*Addresses and Proc. Nat. Ed. Assoc.*, 56 (1912), pp. 1366-1373).—This paper briefly summarizes the circumstances leading to the passage by the Ohio legislature in 1911 of the act making the teaching of agriculture mandatory in the high and elementary schools of the rural districts and villages of the State. There is also a brief discussion of the manner in which the work has been carried on and its effect on the viewpoint of the average country boy or girl as to farm life.

Industrial education in Columbus, Ga., R. B. DANIEL (*U. S. Bur. Ed. Bul.*, 1913, No. 25, pp. 59, pls. 6).—This bulletin presents a study of the adaptation of the work of the public schools to the conditions and needs of children as being worked out in two schools in Columbus, Ga. Among the special features are the introduction of courses in normal training, home economics, and mechanical arts, industrial work for negroes, a school for children of mill operatives, and an industrial high school.

Household ethics and industrial training in the colored schools of Kentucky, C. L. TIMMELAKE (*Ky. Dept. Ed. [Bul.]*, 6 (1913), No. 8, pp. 58, pls. 7).—The author discusses the need of instruction in household ethics and industrial training for colored youth, the duties of parents, and lessons in home making, and gives data for use in teaching home economics and agriculture in schools of different grades.

Domestic economy—the family budget, G. FLETCHER (*Dept. Agr. and Tech. Instr. Ireland Jour.*, 13 (1913), No. 4, pp. 735-739).—In this paper, read before the twelfth annual congress of the Irish Technical Instruction Association, Bangor, the author discusses the present status of home economics instruction in Ireland.

Of 112 girls' secondary schools 65 offer instruction in home economics to a total of 1,640 students, and the subject is also taught in every technical school. Outside of large centers there are over 70 itinerant teachers who give

instruction to hundreds of rural centers. The author points out the need of the further extension of this work beyond cookery, laundry work, and needle work, to include systematic instruction in the laws of health, home nursing, and first aid to the injured, and suggests that training for home duties form a part of the education of every girl, and be closely related to her means.

Manual processes of agriculture (*Rpt. Rural Ed. Conf. [61. Brit.], 8 (1913), pp. 27*).—As a result of its inquiry into the methods which local education authorities in Great Britain adopt with the object of promoting efficiency in the performance of manual processes, e. g., plowing, hedging, ditching, sheep shearing, milking, and basket making, the Rural Education Conference recommends that (1) instruction in certain manual processes should be provided for the older boys and girls attending elementary schools in rural districts, and that (2) local education authorities and managers of rural elementary schools should regulate the holidays so as to leave the boys free to work on the land at a time when their work is most useful.

For boys and men employed upon the land it is recommended that classes in manual processes should be conducted more in the nature of assistance to rather than formal instruction of those who attend, and the interest and sympathy of the farmers in this work should be secured. Such instruction should be more generally provided by local education authorities throughout England and Wales, and the courses at present provided in most counties should be made more thorough. Local authorities should offer certificates to be completed for by the students at the end of the class, and local societies which organize classes and competitions in manual processes should be encouraged and assisted by local education authorities, although expenditure by local education authorities on money prizes should be regulated.

The methods employed by local education authorities for giving instruction in manual processes at farm schools or agricultural colleges, by itinerant instructors, and through local agricultural societies are outlined, including the duration and subjects of instruction, competitions, and cost of instruction. In half the counties of England and Wales no provision is made by the local education authorities for instructing agricultural laborers in manual processes. Appendixes are added containing summaries of evidence as to the value of instruction in manual processes in the counties in which it is being provided and also as to the need for such instruction in counties in which no provision is made for it.

Manual instruction for adults in rural centers. H. GAMMART (*Dept. Agr. and Tech. Instr. Ireland Jour.*, 13 (1913), No. 4, pp. 738-753). The author describes the methods now generally employed in the teaching of manual work in adult itinerant classes in Ireland, outlines briefly the ground to be covered in the teaching of constructional drawing for farmers which is an advance upon the itinerant work and forms part of a technical school course adapted to the needs of farmers, shows how the work may be arranged into a definite course, and finally indicates the direction which the teaching of construction should take.

Technical instruction in plowing. A. MURRAY (*Jour. Rd. Agr. [London]*, 20 (1913), No. 2, pp. 116-120).—An outline is given of a system of instruction in plowing which has been fostered for several years by the agricultural committee of the Hants County Council. The director of education of the county appoints the instructor and pays all expenses in connection with the classes. In one district last year there were 5 centers of such instruction with an attendance of about 60 pupils, all of whom received a minimum of 12 hours' instruction each. At the close of the instruction a plowing competition is held and prizes are awarded by the county council.

NOTES.

Missouri University and Station.—Farmers' Week at the college of agriculture, January 12-16, brought out a record attendance of 2,287, representing 19 States and 92 of the 114 counties. The enrollment in the regular short courses also set a new record of 329 students from 84 counties and from 7 States outside of Missouri.

The college has arranged a continuous series of 5-day branch short courses, beginning January 5 and continuing for 2 months. Tentative plans are also being made for holding at least two additional courses in March. Lucius F. Childers, professor of agronomy and agronomist at the Idaho University and Station during 1910-1912, has been appointed assistant professor of agronomy for extension work, particularly in connection with these branch short courses.

New Mexico College and Station.—The college is undertaking extension work through short courses for demonstrations and lectures, to be given to a limited number of counties at a nominal expense to cover some of the traveling expenses. These courses will consist of 5 consecutive meetings at a central place, probably extending over a period of 5 weeks and usually with two departments represented at each meeting.

Rupert L. Stewart has resigned as farm foreman and will specialize in farm management at Cornell University. He has been succeeded by Roland Harwell, formerly assistant in irrigation, and subsequently in commercial work.

Cornell University.—A summer term similar to the two winter terms has been established in the college of agriculture. This will extend from about June 8 to September 23 and is intended primarily for advanced undergraduates, graduate students, and instructors from this and other institutions. Its adoption allows the completion of the regular 4-year course in agriculture in 3 years.

According to the *Tribune Farmer*, the college is to cooperate with the New York Central and Hudson River Railroad Company in an agricultural consultation train over portions of its Mohawk, Ontario, St. Lawrence, and Adirondack divisions. No formal lectures will be given, but 2 cars of exhibits from the plant breeding experiments will be shown and instructors accompanying the exhibits will interpret the experiments for the use of the farmer.

Science announces that Dr. J. H. Comstock, instructor and professor of entomology for 39 years, is to retire at the close of the academic year.

Pennsylvania College and Station.—Recent appointments include Fred J. Holben as assistant chemist and E. De Turk (Purdue, 1913) as assistant agricultural chemist, vice C. A. Smith resigned to take up graduate work. J. F. Cox, instructor in soils, has resigned to become instructor in farm crops at the Michigan College.

West Virginia University and Station.—Nat T. Frame, recently county agent at Louisville, Ky., has been appointed state agent in charge of farmers' cooperative demonstration work. R. E. Hunt and I. B. Johnson, assistants in animal husbandry, have resigned, the former to become associate in animal husbandry at the Virginia College and the latter to accept an appointment as county demonstration agent in Indiana. }
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